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The Interlaboratory Experiment IDA-72 on Mass Spectrometric Isotope Dilution Analysis

Volume II

Edited by
W. Beyrich, E. Drosselmeyer

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W. Beyrich * and E. Drosselmeyer **

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* EURATOM, delegated to the Institute for Applied Systems Analysis and Reactor Physics (IASR), Gesellschaft für Kernforschung (GfK), Karlsruhe, Germany

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The Interlaboratory Experiment IDA-72 on Mass Spectrometric Isotope Dilution Analysis

Volume II of the report on the IDA-72 experiment contains papers written by different authors on a number of special topics connected with the preparation, performance and evaluation of the interlaboratory test. In detail the sampling procedures for active samples of the reprocessing plant and the preparation of inactive reference and spike solution from standard material are described as well as new methods of sample conditioning by evaporation.

An extra chapter is devoted to the chemical sample treatment as a preparation for mass spectrometric analysis of the U and Pu content of the solutions. Special topics are also methods for mass discrimination corrections, α-spectrometer measurements as a supplement for the determination of Pu-238 and the comparison of concentration determinations by mass spectrometric isotope dilution analysis with those performed by X-ray fluorescence spectrometry.

The last part of this volume contains papers connected with the computerized statistical evaluation of the high number of data.

Der Interlaboratoriumstest IDA-72 zur massenspektrometrischen Isotopenverdünnungsanalyse

Band II des Berichtes über das IDA-72-Experiment enthält Beiträge von verschiedenen Autoren zu einer Anzahl besonderer Themen im Zusammenhang mit der Vorbereitung, Durchführung und Auswertung des Interlaboratoriumstests. Im einzelnen sind sowohl das Probenahmeverfahren für die aktiven Proben aus der Wiederaufarbeitungsanlage und die Vorbereitung inaktiver Referenzlösung und Spikelösung aus Standardmaterial beschrieben als auch neue Methoden der Probenbehandlung durch Eindampfen.

Ein eigenes Kapitel beschäftigt sich mit der chemischen Probenbehandlung als Vorbereitung für die massenspektrometrische Analyse des U- und Pu-Gehaltes der Lösungen. Weitere Themen sind die Methoden zur Korrektur der Massendiskriminierung, α-spektrometrische Messungen als ergänzende Methode zur Bestimmung von Pu-238 und der Vergleich der Konzentrationsbestimmungen durch massenspektrometrische Isotopenverdünnungsanalyse mit solchen durch Röntgenfluoreszenzspektrometrie.

Der letzte Teil des Bandes enthält Arbeiten zur statistischen Auswertung der Vielzahl von Daten mit einer Großrechenanlage.

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Preface and Acknowledgement

In this second volume on the IDA-72 experiment reports on different special topics connected with the preparation, organisation, performance and evaluation of the interlaboratory test are collected.

In this context it becomes evident that the execution of the experiment would not have been possible without the contributions of all those who have been actively involved. This experiment is based on the common knowledge, experience and actual work of a very active group of those interested in the method under study. The editors would like to thank all authors for their kind collaboration.

The papers collected in this volume are based on the collaboration of the participating laboratories with the evaluation group. The participating laboratories and the names of all those, who have been actively involved in the experiment, are given in Volume I.

The Editors

1. Compilation of Constants Used

by

W. Beyrich* and E. Drosselmeyer**

* EURATOM, delegated to the Institute for Applied Systems Analysis and Reactor Physics (IASR), Gesellschaft für Kernforschung (GfK), Karlsruhe, Germany

** IASR, GfK, Karlsruhe, Germany

1.1 Nuclide Masses of the Uranium and Plutonium Isotopes

In the following, the constants used by the evaluation staff of the IDA-72 experiment are given.

U-233: 233.0395

U-234: 234.0409

U-235: 235.0439

U-236: 236.0457

U-238: 238.0508

Pu-238: 238.0495

Pu-239: 239.0522

Pu-240: 240.0540

Pu-241: 241.0567

Pu-242: 242.0587

They are taken from Ref. /1/.

1.2 Avogadro Constant

$$N_A = 6.022045(31) \cdot 10^{23} \ \text{mol}^{-1}$$

This value, recommended by CODATA, is given in Ref. /2/.

1.3 Half Life Times of the Plutonium Isotopes

1.3.1 α-Decay:

$\tau(238) = 87.7$ years

$\tau(239) = 2.44 \cdot 10^4$ years

$\tau(240) = 6.58 \cdot 10^3$ years

The value for Pu-238 is given in Ref. /3/, the values for Pu-239 and Pu-240 are given in Ref. /4/.

1.3.2 β-Decay:

$\tau(241) = 15.10 \pm 0.14$ years.

This value was determined by measuring the ratios Pu-241/Pu-240 and Pu-241/Pu-242 during 6.65 years, it is given in Ref. /5/.

2. Sampling for the IDA-72 Experiment at EUROCHEMIC

by

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Abstract

The sampling procedure used for the IDA-72 experiment is described in detail.

Input tank homogenization procedures, descriptions of the sampling system, the density measurement system, the weighing of aliquots, and the dilution system are given.

Error estimates for each step in the sampling procedure are given.

2.1 Introduction

The samples that served for the IDA-72 experiment came from the reactor TRINO, Vercellese, a PWR with net output of 247 MWe.

Two elements were dissolved, with a total quantity of ~600 kg of uranium.

Burn-up was estimated from the reactor to be 21.400 MWd/t and the intitial enrichment was 3.897 wt % U-235.

About 0.5 % of the total quantity of uranium and about 1 % of the total plutonium was material recycled with the acid used for dissolution.
The recycled material originated from another type of reactor (CANDU-type).

Chemical decladding is used at EUROCHEMIC and prior to the dissolution the stainless steel canning was removed with H_2SO_4.
Less than 1 % of uranium and ~0.5 % of plutonium was lost to the decladding solution.

After dissolution of the uranium dioxide with nitric acid, the dissolver solution was cooled down and then transferred by steam jet to the input tank used in the experiment (221.4), a cylindrical slab tank with a nominal volume of 3000 l. This transfer was performed ~36 hours prior to sampling.
During standing, gentle air-sparging took place.
At sampling, the solution contained approximately 223 g/l U, 1.8 g/l Pu, 1.9 M nitric acid and an activity of about 250 Ci/l.

2.2 Sampling

2.2.1 General

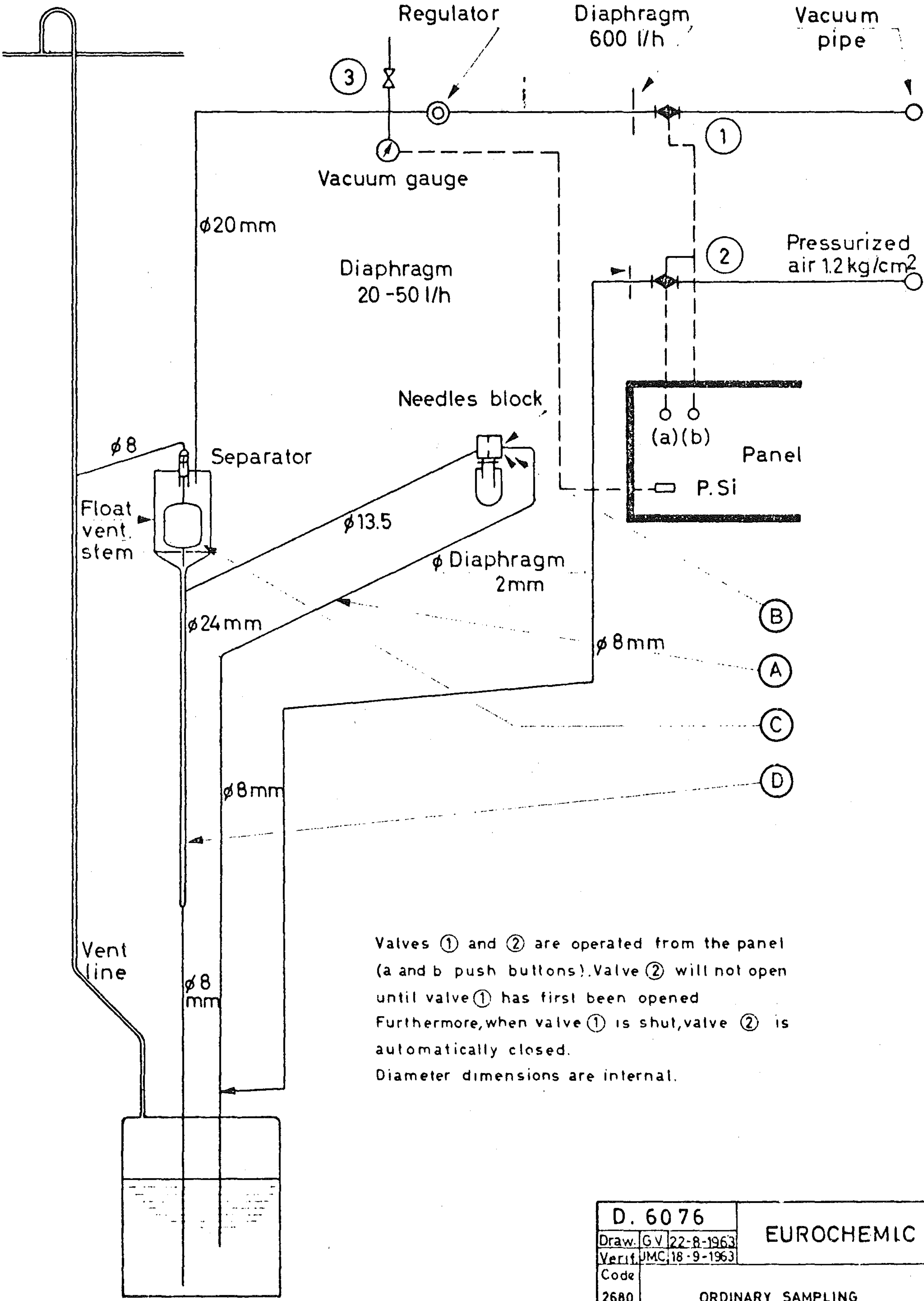
The sampling procedure started 05.00h on 21.6.72 with one of the authors present to supervise this important part of the operation.

Vigorous air sparging of the solution in the tank was started at 05.00h and the first sample was drawn about 40 minutes later. Sparging for half an hour is more than sufficient to produce a homogeneous solution in the tank. During sampling gentle air sparging took place .

The sampling system can briefly be described as follows /Fig. 2-1/.

A sample bottle, penicillin type of 5ml total volume, closed with a rubber septum and an aluminium cap, is pierced by a double needle sitting on a "needle block". By aid of a vacuum system and an air lift, the solution to be sampled enters the sample bottle through one needle and returns to the tank via the other needle. In this way, the lines leading to and from the tank and the rest of the sampling system are efficiently rinsed with the solution to be sampled. The first sample bottle in a series of samples is so flushed for 10 minutes on the needle block.

The EUROCHEMIC experience with such a system is very good and for years no cross contamination or inhomogeneities have been detected when homogenization and sampling have been properly executed. Needless to say, the sampling is performed remotely in a heavily shielded blister. Manipulations are done with tongs.



Valves ① and ② are operated from the panel (a and b push buttons). Valve ② will not open until valve ① has first been opened. Furthermore, when valve ① is shut, valve ② is automatically closed.

Diameter dimensions are internal.

D. 6076		EUROCHEMIC
Draw.	G V 22-8-1963	
Verif.	JMC 18-9-1963	
Code 2680		ORDINARY SAMPLING SYSTEM FLOWSHEET
FIG 2-1		

2.2.2 The IDA-72 Samples

Prior to the sampling for the IDA-72 experiment, the samples required by EUROCHEMIC for their normal input analyses were taken.

The IDA-72 experiment required 8 samples as shown in Fig. 2-2. Also shown in this figure are the times when the samples were taken and other information pertinent to the experiment.

All samples were transferred to the analytical laboratory by pneumatic post where they were immediately stored in upright position awaiting further treatment as requested and described below.

2.3 Measurements and Treatments Performed on IDA-72 Samples by EUROCHEMIC

2.3.1 Density Determinations

A set of homogeneous samples, representative for the whole batch, was a prime requirement, both for assessing the batch at EUROCHEMIC and for the IDA-72 experiment. Thus, it was decided to use the normal EUROCHEMIC procedure for input sampling and draw the IDA-72 samples at the same time.

The homogeneity of an input batch is established by density measurements on different samples.

As can be seen from Fig. 2-2, density was measured on samples 2,3,A,B,C and F. Bottle 1 is never used in the input procedure as the risk for contamination from previous batches is highest in this sample.

Date	Sample	EUROCHEMIC Input Samples			I D A - 72 Samples								
		1	2	3	A	B	C	D	E_1	E_2	E_3	E_4	F
21.6.1972	Time of sampling [h.min]	05.35	05.45	05.55	06.35	06.30	06.25	-	06.40	06.45	06.50	06.55	07.00
	Density at 30°C [g/ml]	-	1.3728	-	1.3728	1.3727	-	-	-	-	-	-	1.3719
	Aliquot weight [g]	-	0.9861	-	2.2149	2.0970	-	-	-	-	-	-	0.5546
	Time of dilution [h.min]	-	08.00	-	10.30	14.30	-	-	-	-	-	-	16.00
	Approx.dil. factor	-	-	-	161	171	-	-	-	-	-	-	20
	Volume after dilution [ml]	-	-	-	262.46	262.46	-	-	-	-	-	-	-
	Weight after dilution [g]	-	-	-	-	-	-	-	-	-	-	-	8.8857
	Density of dil. 30°C [g/ml]	-	-	-	1.1622	1.1622	-	-	-	-	-	-	1.1705
22.6.1973	Density at 30°C [g/ml]	-	-	-	-	-	1.3729	-	-	-	-	-	-
	Aliquot weight [g]	-	-	-	-	-	3.7326	-	-	-	-	-	-
	Time of dilution [h.min]	-	-	-	-	-	10.00	-	-	-	-	-	-
	Density of dil. 30°C [g/ml]	-	-	-	-	-	1.1636	-	-	-	-	-	-
	Time of filling D [h.min]	-	-	-	-	-	-	10.30	-	-	-	-	-

Dilution liquid : 5.0 M HNO_3 with density : 1.1609 at 30°C.
Time Sequence and Measurements Performed at EUROCHEMIC for IDA-72.

Figure 2-2

All density values were consistent and the homogeneity of the batch and the samples thus established.

The density was measured by the vibrating capillary method, whose principle is shown in Fig. 2-3 and can be described as follows:

A capillary in the form of a V is filled with the liquid whose density is to be measured. The tip of the capillary can vibrate freely whereas the entry- and exit- points of the capillary are fixed in a large mass of stainless steel.

The resonance frequency of the vibrating capillary depends on the mass of the capillary and consequently will change with the density of the filling solution since the volume remains constant. Thus a proportionality exists between the resonance frequency and the density of the solution. The resonance frequency (or rather the time necessary for a fixed number of vibrations at the resonance frequency) is measured electronically.

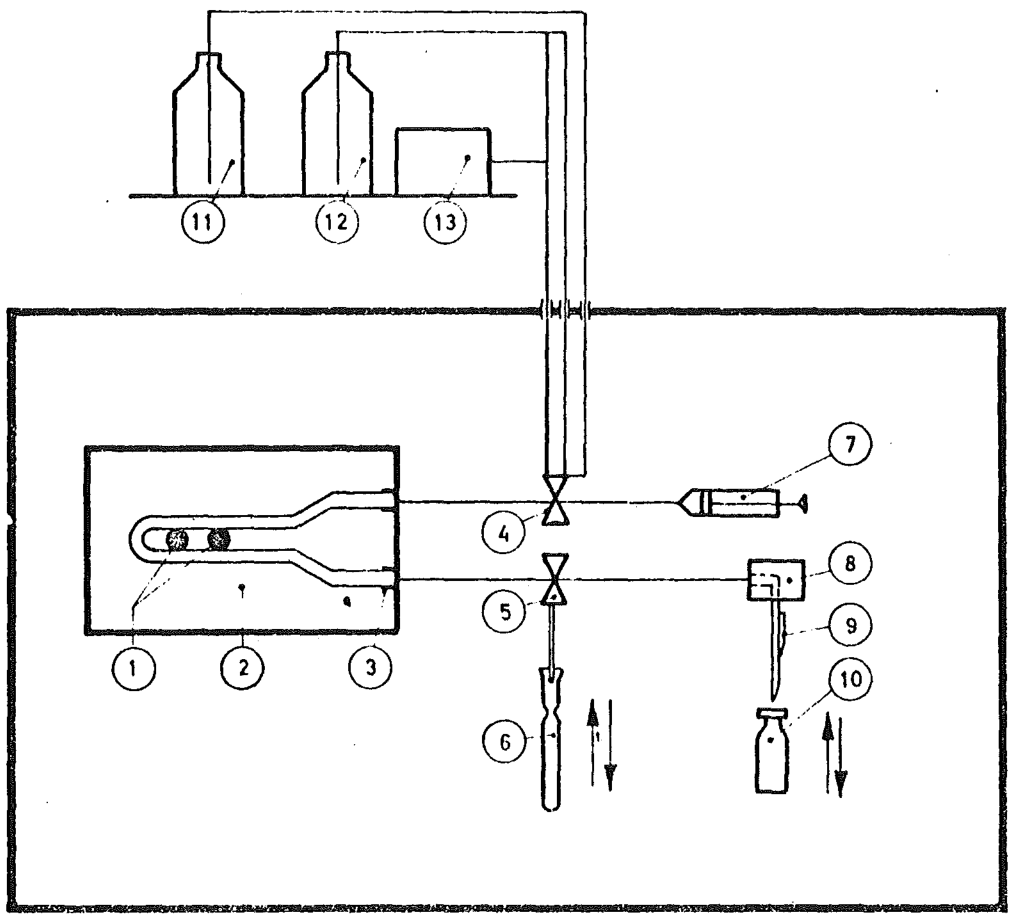
Two magnets are fixed to the capillary, one is used to set the system into vibrations, the other is used to record the number of vibrations.

The excitation and detection are fully electronic.
The capillary is isolated and the measurements take place at 30 ± 0.05 °C.

Calibration and control of the instrument is done prior to and after each density measurement with ambiant air (corrections for humidity, barometric pressure and box underpressure are applied) and distilled water.

Less frequently, standards with other densities are measured to verify the well established, excellent linearity.

Aliquots can be filled directly from the densitometer into preweighed aliquot containers, specially designed with the purpose of directly delivering the aliquot to the dilution vessels.



LEGEND:

1. Magnet on oscillating glass tube.
2. Thermal insulation containing heating wires and thermistors.
3. Fixing point of oscillating tube.
4. 5-way Hamilton valve.
5. 3-way Hamilton valve.
6. Glass extraction tube or aliquot vessel.
7. Syringe.
8. Needle block
9. Needle with bypass for air and filter.
10. Sample bottle.
11. Storage bottle for bidist. water.
12. Storage bottle for acetone p.a.
13. Motor driven air pump.

Fig. 2-3.

SCHEMATIC FLOWSHEET OF THE DENSITY DETERMINATION IN A SHIELDED BOX

2.3.2 Weighing of the Samples

Prior to the dilution step, the aliquot is weighed on a remotely installed analytical balance, type Metter H-16. The balance is controlled daily with a standard weight, weighing approximately the same as a filled aliquot container.
Less frequently, standard weights are measured to control the balance.
With precise density and weight determinations, the volume is also known precisely.
The aliquot size can be varied according to wish by for example counting the number of drops to the aliquot vessel as the drop size is well known.

2.3.3 Dilution of the Samples

Following aliquotation, dilution is immediately performed in a shielded box adjacent to the balance box. The dilution system in use at EUROCHEMIC is shown schematically in Fig. 2-4.

With the aliquot transfer vessel in position above the dilution vessel and about 50 ml of dilution liquid (5 M HNO_3 in the case of IDA-72) present in the dilution vessel, filling takes place slowly via the aliquot vessel.
Following several rinse steps, the teflon cone is firmly placed into the aliquot container and approximately 200 ml of the dilution liquid passes through the aliquot vessel. The aliquot vessel is then removed and the solution stirred magnetically. The dilution vessel bulb is flushed with a special spray head and then slowly filled via a special line until contact is made between Pt-electrodes and the solution.

After thorough mixing, about 50 ml solution passes the outlet system to ensure an effective rinse of this part of the system. The rest of the solution serves for aliquots as needed.

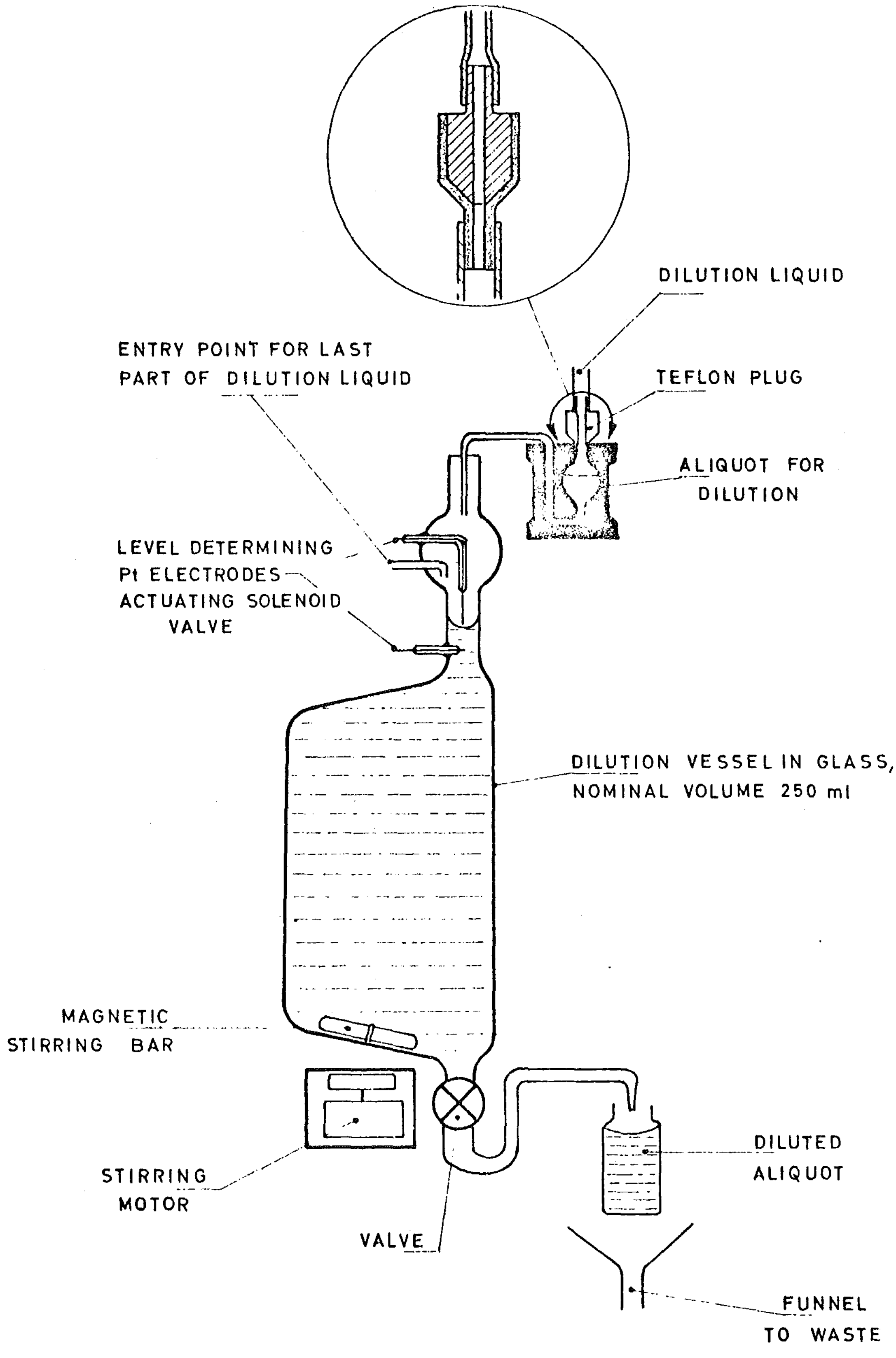


Fig. 2-4.

EUROCHEMIC HOT SAMPLES
DILUTION SYSTEM

2.3.4 Error Sources and Precision Estimates

The IDA-72 samples A and B originated through the following steps:

A) Sampling
B) Density measurements and aliquotation
C) Weighing of aliquots
D) Dilution of aliquots
E) Weighing of diluted samples (CBNM)
f) Spiking of diluted samples (CBNM)

The points E) and F) are treated in the next chapter

The points A) - D) are shortly discussed below.

A) The errors introduced by drawing the samples (tank inhomogeneities and cross contamination from sampling system) are believed to be small compared to other error sources.
This is concluded from long term EUROCHEMIC input experience.

B) The density measurements performed on a series of input samples rarely exceed a range of 0.03 % and the contribution from the density measurement to the overall error in the EUROCHEMIC input procedure is small.
Careful rinsing and control of the densitometer also makes cross contamination from previous samples unlikely.

C) The remote weighing step is performed with an overall precision of 0.01 % (standard deviation on a single aliquot weight determination).

D) The most critical step in the EUROCHEMIC input procedure is in our opinion the remote dilution step where the following phenomena may contribute to undetected errors:

- Incomplete transfer of aliquot to dilution vessel.
- Undetected leaks from bottom valve of dilution vessel during the dilution step.
- Incorrect volume reading by Pt-electrodes or leaking solenoid valve system.
- Inhomogeneities in diluted aliquot solution.
- Cross contamination from previous solutions caused by insufficient rinsing of outlet system.

It goes without saying that all of the above steps are carefully controlled and extreme care is executed during a dilution.

The calibration of the dilution vessel is performed outside the shielded box by weighing the vessel filled with 1 M HNO_3 (the dilution liquid normally used at EUROCHEMIC) to be nearest 0.01 g.

The volume is controlled by the Pt-electrode system with the solenoid valve and feeding bottles at the sames positions relative to the dilution vessel as used in the shielded box.

Calibration results give a relative standard deviation of 0.03 % for a single measurement.
Keeping in mind that calibration is executed under optimum conditions, our best estimate of the remote dilution error is 0.1-0.2 % (relative standard deviation).

This figure is in good agreement with evaluated EUROCHEMIC experience on input analyses where the dilution step is part of the procedure.

The table below summarizes this chapter.

PRECISION ESTIMATES FOR IDA-72.

STEP	OPERATION	ERROR SOURCES	PRECISION *
A	Sampling	Inhomogeneities Sampling error	0.1 %
B	Density and aliquotation	Instrumental errors Cross contamination Evaporation	0.02 %
C	Weighing of aliquots	Remote weighing error Evaporation	0.1 %
D	Dilution of aliquots	Transfer errors Inhomogeneities Instrumental errors	0.1-0.2 %

* Standard deviation of a single measurement.

3. Sample Preparation and Assay at CBNM for the IDA - 72 Experiment

by

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Geel, Belgium

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3.1 Introduction

It was decided at the Vienna analytical working group meeting on 6 and 7 December 1971 that the samples (including the spiked samples) and reference solutions for the IDA-72 experiment would be prepared by CBNM (Geel) with the assistance of EUROCHEMIC and SCK/CEN(Mol).

This chapter reports on the preparation and assay of these samples. The total experiment is illustrated in a scheme given in Fig. 3-1.

IDA - 72 EXPERIMENT

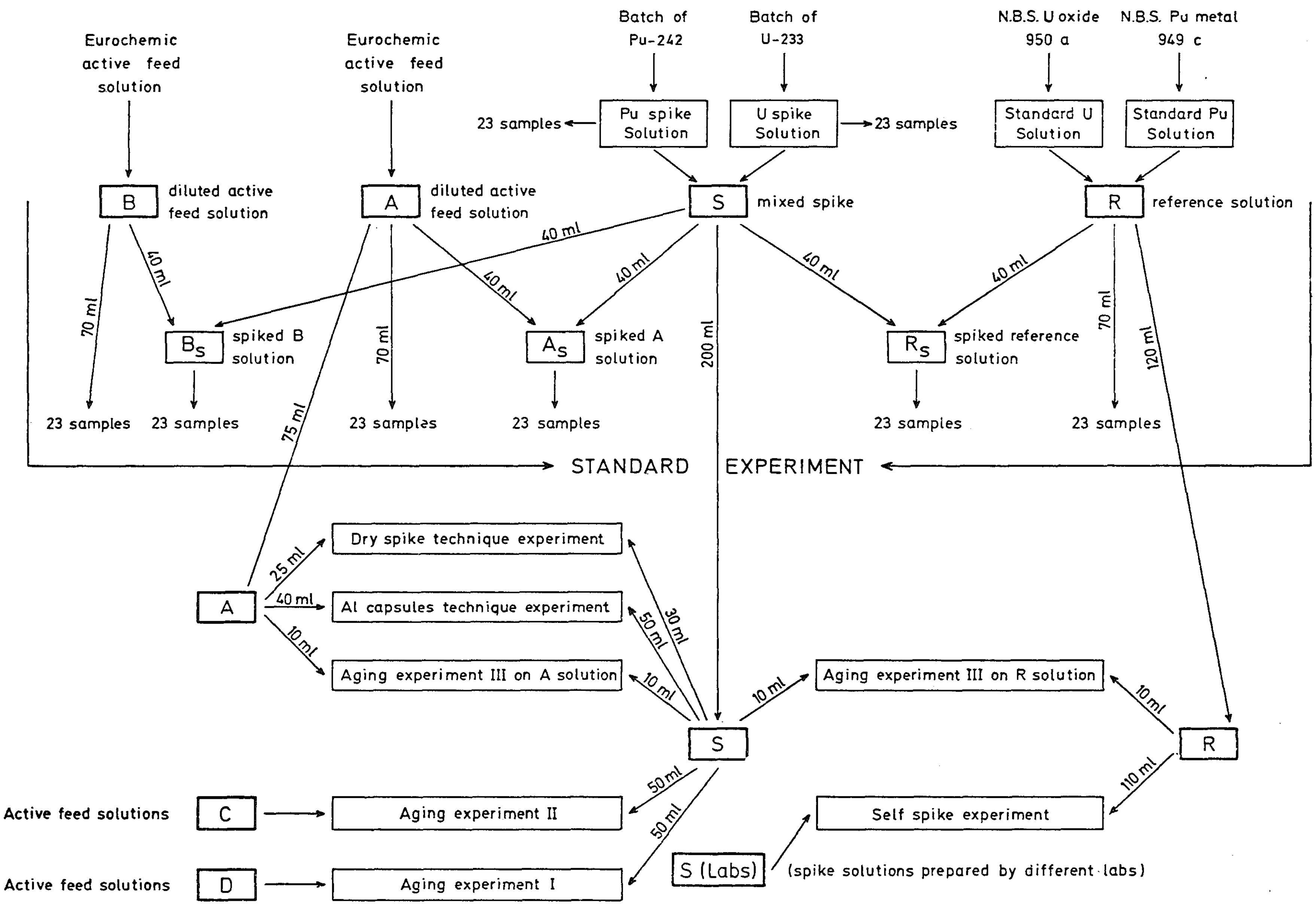


Fig. 3-1

3.2 Samples for the Standard Experiment:

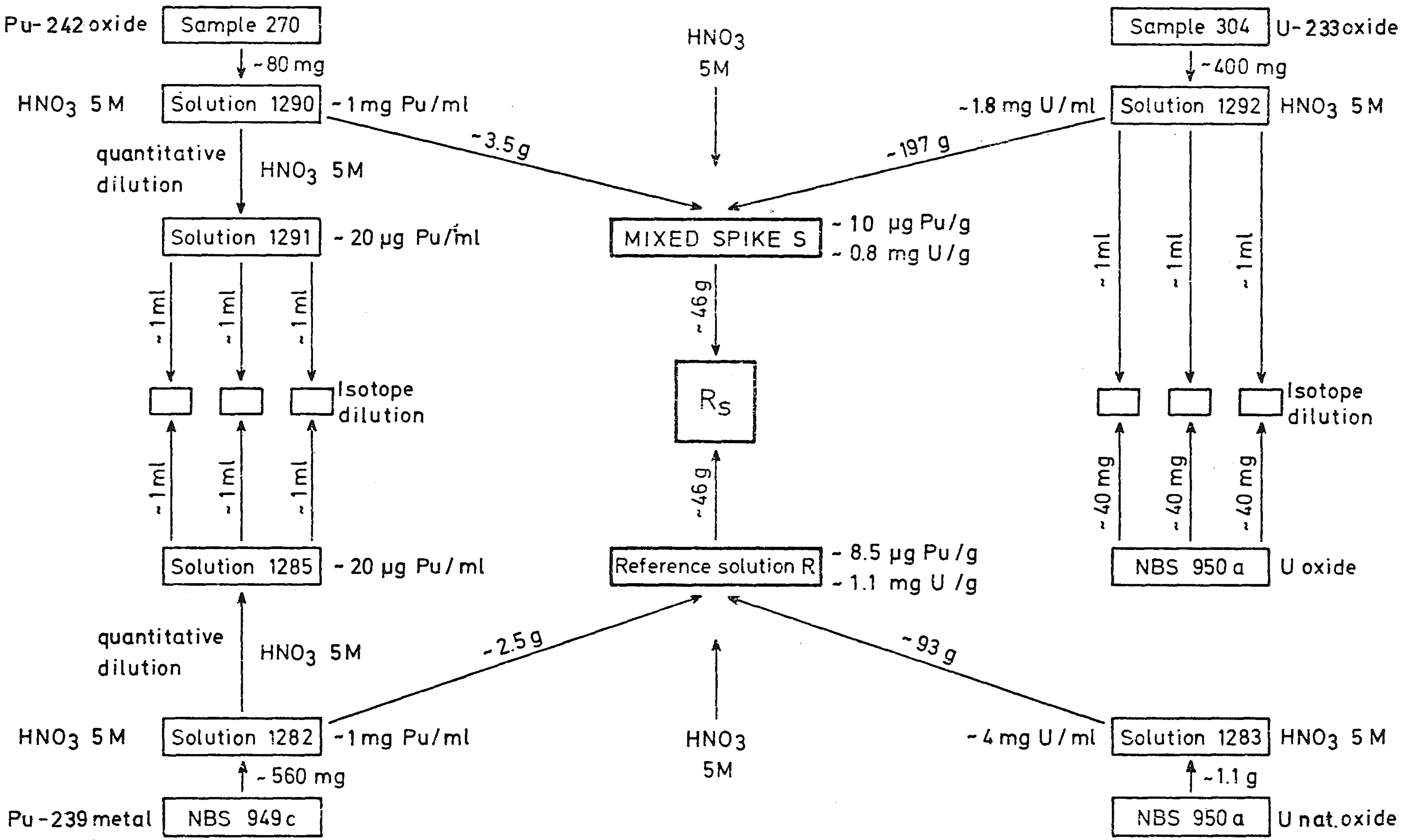
The standard experiment involves:

1. preparation, definition and aliquoting of a reference solution R.
2. preparation, definition and aliquoting of a mixed spike solution S.
3. preparation and aliquoting of a spiked reference solution R_s.
4. aliquoting and spiking of an active feed solution A.
5. aliquoting and spiking of an active feed solution B.

3.2.1 Reference Solution R

The required characteristics of this solution were the following: 1 mg U and 10 μg Pu per ml of a 5 molar nitric acid solution. The R solution was prepared by mixing weighed fractions of a plutonium reference solution and of a uranium reference solution. The chemically well-characterized NBS materials largely used by analytical chemists working in the nuclear field were considered to be the most appropriate materials for the preparation of an U and Pu reference solution.
The plutonium solution (1282)was a 5 molar nitric acid solution containing 0,56445 $\pm$ 0,00005 g of NBS 949 c plutonium in 573.424 $\pm$ 0.005 g of solution. The plutonium metal was dissolved in HCl. After addition of 10 ml of concentrated nitric acid the solution was evaporated to moistness. This operation was repeated three times. The nitrate was finally dissolved in 50 ml of 5 M nitric acid and the solution was transferred one day later in a weighed flask and diluted up to 500 ml. This solution was weighed just before use.
The uranium solution (1283) was a 5 molar nitric acid solution of 292.694 $\pm$ 0.003 g containing the uranium equivalent to 1.1720 $\pm$ 0.0001 g of NBS uranium oxide 950 a, ingnited one hour at 900°C before weighing. The uranium oxide was dissolved in HNO_3 1:1.

Fig. 3-2 IDA - 72 MIXED SPIKE AND REFERENCE SOLUTIONS



The solution was evaporated to moistness. The nitrate was finally dissolved in 50 ml of 5M nitric acid and the solution was transferred one day later in a weighed flask and diluted to 250 ml. The solution was weighed just before use.
The reference solution R was obtained by mixing 2.5110 ± 0.0005 g of the Pu solution (1282) with 93.912 ± 0.001 g of the U solution (1283) and adding 5 molar nitric acid to a total weight of 287.402 ± 0.003 g. The different steps of the preparative work are summarized in the scheme given in Fig. 3-2.

The Pu concentration was calculated (see foot-note (1)) to be 8.599 µg Pu per g of solution. NBS certification for the material 949 c is 99.99 ± 0.06 % Pu.
The U concentration (see foot-note (2)) was calculated to be 1.1088 mg U per g of solution. NBS certification for material 950 a is 99.94 ± 0.02 % U_3O_8.
Taking into account the uncertainties on the weighings and on the NBS materials, the uncertainty on both U and Pu concentrations was less than ± 0.1 %.
The isotopic composition of the NBS 950 a material measured at CBNM is in atom %:

U-234	0.0055
U-235	0.7203 ± 0.0007
U-238	99.2742

The isotopic composition of the NBS 949 c material measured at

---

(1) Pu concentration calculation= $\frac{0.56445 \cdot 0.9999 \cdot 2.5110}{573.424 \cdot 287.402} = 8.599$ 10^{-6} g Pu/g solution

(2) U concentration calculation= $\frac{1.1720 \cdot 0.8480 \cdot 0.9994 \cdot 93.912}{292.694 \cdot 287.402} = 1.1088$ 10^{-3} g U/g solution

CBNM and valid for January 20, 1972 is in atom %:

Pu-238	0.0039
Pu-239	97.3553 ± 0.0090
Pu-240	2.5652
Pu-241	0.0724
Pu-242	0.0032

According to the approximate figures given in Fig. 3-1 aliquots of the solution R have been used for the standard experiment, the self-spike experiment, and the aging experiment III.

3.2.2 Mixed Spike Solution S

The required characteristics of this solution were the following: 1 mg of U, highly enriched in U-233, and 10 μg of Pu, highly enriched in Pu-242, per ml of a 5 molar nitric acid solution. The solution S was prepared by mixing weighed fractions of chemically and isotopically well-defined plutonium and uranium solutions.

The different steps of the preparative work are summarized in the diagram given in Fig. 3-2.

The Pu solution (1290) was a 5 molar nitric acid solution. About 80 ml of plutonium oxide were dissolved in concentrated nitric acid containing a drop of hydrofluoric acid. The solution was evaporated to moistness and the nitrate dissolved in 20 ml of 5M nitric acid. One day later the solution was diluted to 80 ml.

The major impurities in the plutonium oxide measured by emission spectrography were 350 ppm of iron and 20 ppm of copper.

The solution (1290) of enriched Pu-242 was assayed on a diluted fraction (1291) by triplicate isotope dilution mass spectrometry as follows:

sampling unknown 242 Pu solution (1291) (g)	adding fractions of NBS 949 c solution (1285) (g)	$^{239}Pu/^{242}Pu$ atomic ratio observed in blend	concentration of the unknown solution (μg/g solution)
1. 1.16488	1.17276	0.8534	26.975
2. 1.16598	1.12694	0.8193	26.975
			26.975
3.* 1.13342	1.11562	0.8350	26.956
Accuracy:			
± 0.00005	± 0.00005	± 0.0013	± 0.054 (±0.2%)

* The third determination was performed one week later to check additionally whether nothing happened to the solution during the sampling.

The isotopic composition (atom %) of the material was determined to be:

Pu-238	0.003
Pu-239	0.020
Pu-240	0.084
Pu-241	0.075
Pu-242	99.818 ± 0.010

and is valid for July 27, 1973.

The concentration of the original Pu-242 solution (1290) used to blend the S solution was obtained from the dilution factor:

$$26.975\ \mu g/g \cdot \frac{280.652\ g}{7.4293\ g} = 1.0190 \pm 0.0020\ \text{mg Pu/g sol.}$$

The NBS 949 c solution (1285) used in this assay was prepared by dissolving 564.45 ± 0.05 mg Pu NBS 949 c metal in HNO_3 to a solution of 573.424 g (1282) and diluting to:

$$\frac{564.45}{573.424} \cdot \frac{3.7125}{157.845} = 23.152\ \mu g\ \text{Pu/g sol.}$$

The uranium solution (1292) was a 5 molar nitric acid solution prepared under the same conditions as the U reference solution. This material was rather impure and contained about 1% of iron as a major impurity, magnesium and plutonium were present respectively at the 500 and 250 ppm levels.
The material was delivered only one day before use and it was not possible to analyze and purify it before the preparation.
The enriched U-233 solution (1292) was assayed by triplicate isotope dilution mass spectrometry as follows:

sampling unknown U-233 solution (1292)(g)	adding NBS 950 a oxide (g)	U-233/U-238 atomic ratio observed in blend	concentration of the unknown U-233 solution (mg U/g solution)
1. 1.16794	0.040006	0.053180	1.5371
2. 1.17200	0.040366	0.052907	1.5376
			Mean: 1.5374
3.* 1.14695	0.039582	0.052861	1.5393
Accuracy:			
± 0.00005	± 0.000004	± 0.000080	± 0.0031 (± 0.2%)

* The third determination was performed one week later to check additionally whether nothing happened to the solution during the samplings.

The isotopic composition (in atom %) of the material was determined to be :

U-233	97.779 ± 0.010
U-234	0.018
U-235	0.040
U-236	0.003
U-238	2.163

An isotope dilution mass spectrometry concentration measurement of 0.397 μg of plutonium per g of solution has also been performed on the solution 1292. This plutonium concentration has to be taken into account when calculating the plutonium concentration in the mixed spike solution S.

The mixed spike solution S was obtained by mixing 3.5480 ± 0.0005 g of the plutonium solution (1290) with 197.482 ± 0.002 g of the uranium solution (1292)and adding 5 molar nitric acid to a total weight of 366.238 ± 0.003 g.

The Pu concentration was calculated (see foot-note (1)) to be 10.085 µg Pu per g of solution. The U concentration was calculated (see foot-note (2)) to be 0.8290 mg U per g of solution. Taking into account the uncertainties on the weighings and on the assay of the uranium and plutonium solutions, the uncertainty on both U and Pu concentrations was less than ± 0.25 %.

The isotopic composition (atom %) of the plutonium in the mixed spike solution S was determined to be:

Pu-238	0.0044
Pu-239	1.3084
Pu-240	0.5923
Pu-241	0.1007
Pu-242	97.9942

The aliquoting for the standard experiment, the dry spike experiment, the aluminium capsule technique experiment, the aging effect experiments I to III was done according to the approximate figures given in Fig. 3-1.

A fraction of the Pu-242 solution (1290) was diluted to about 20 µg Pu/ml and 23 aliquots (vials 1 to 23) of this solution were taken for distribution as pure Pu-242 spike solution (239/242 and 240/242 atomic ratio measurements).

A fraction of the U-233 solution (1292) was diluted to about 20µg U/ml and 23 aliquots (vials 24 to 46) were taken for distribution as pure U-233 spike solution (238/233 atomic ratio measurements).

---

(1) Pu concentration calculation: $$\frac{1019.0 \cdot 3.5480}{366.238} + \frac{0.397 \cdot 197.482}{366.238} = 10.085 \text{ µg Pu/g solution}$$

(2) U concentration calculation: $$\frac{1.5374 \cdot 197.482}{366.238} = 0.8290 \text{ mg U/g solution}$$

3.2.3 Spiked Reference Solution R_s

The spiked reference solution R_s was prepared at CBNM by mixing 45.943 ± 0.001 g of the R solution (see Par. 3.2.1) with 46.628 ± 0.001 g of the S solution (see Par. 3.2.2).
The R_s solution, after addition of hydroxylamine (about 20 times the theoretical quantity needed to reduce Pu) was heated to 80°C for about 45 minutes and finally split up into 23 aliquots placed in the vials 70 to 92.
At the same time 23 aliquots of the unspiked reference solution R were transferred in vials 47 to 69.

3.2.4 Spiked Active Feed Solution A_s

A fraction of a diluted active feed solution A prepared by Eurochemic was spiked immediately after preparation, mixing 52.154 ± 0.002 g of this solution with 47.114 ± 0.002 g of the spike solution S. For this purpose an aliquot of the spike solution (about 50 ml) was carefully transported from CBNM to the EUROCHEMIC plant. A sensitive balance and its anti-vibration unit was transported from CBNM to EUROCHEMIC for the weighing operations. After addition of hydroxylamine and heating the spiked solution was aliquoted and bottled in vials 203 to 225 (23 samples). At the same time 23 aliquots of the unspiked A solution were transferred to vials 180 to 202.

3.2.5 Spiked Active Feed Solution B_s

A similar preparation like in Par. 3.2.4 was done in the EUROCHEMIC plant using a diluted active feed solution B prepared by EUROCHEMIC. An aliquot of 47.157 ± 0.002 g of the spike solution S was added to 55.377 g ± 0.002 g of the solution B.

Aliquoting in vials 249 to 271 (23 samples) was performed after addition of hydroxylamine and heating.
At the same time 23 aliquots of the unspiked solution B were transferred to vials 226 to 248.

3.3 Additional Experiments

3.3.1 Dry Spike Experiment

The preparation of the samples for this experiment was done by chemists of the IAEA, Vienna, working at the CBNM laboratories. The equipment (fume hoods, balances, vials...), spike solution S and assistance were provided by CBNM. An aliquot of the diluted active feed solution A used for this preparation was transported from EUROCHEMIC to CBNM.

3.3.2 Aluminium Capsules Techniques Experiment

The preparation of the samples for this experiment was done by chemists of the Transuranium Institute, Karlsruhe, working at the CBNM laboratories. As in Par. 3.3.1, equipment, solutions and assistance were provided by CBNM. An aliquot of the diluted active feed solution A used for this preparation was transported from EUROCHEMIC to CBNM.

3.3.3 Distribution of Reference Solution for the Self Spike Experiment

Thirteen vials (no.93-104 and 150) were filled each with about 8 ml of the reference solution R (see Par. 3.2.1), weighed and packed for distribution to the different laboratories participating in the self spike experiment. The weights of the vials filled with solution R, with plastic stopper, but without screw cap, and the masses of solution are given in Table 3-1.

Table 3-1

No. of vial	Weight of vial [g]	Mass of solution [g]
93	22.5001	9.5040
94	22.5413	9.3981
95	22.3310	9.1245
96	22.6440	9.2376
97	22.6709	9.3399
98	22.3672	9.1754
99	22.0576	8.9606
100	21.9315	8.9100
101	22.3996	9.2702
102	22.4460	9.2026
103	22.3297	9.1721
104	22.6141	9.2310
150	20.4164	7.2997

The uncertainty on the masses of solution was $\pm$ 0.0001 g

3.3.4 Distribution of Mixed Spike Solution for the Aging Experiment

Eight vials (no. 105 to 111) were filled, each with about 8 ml of the spike solution S (see Par. 3.2.3) and packed for distribution to three different laboratories participating in the aging experiments I to III. The weight of the vials filled with solution S, with plastic stopper, but without screw-cap, and the masses of solution are given in Table 3-2.

Table 3-2

No. of vial	Weight of vial [g]	Mass of solution [g]
105	22.2211	9.2505
106	22.6158	9.2154
107	22.1564	9.2459
108	22.3651	9.2145
109	22.1940	9.1893
110	21.9502	8.9101
111	22.2852	9.0783

The uncertainty on the masses of solution was ± 0.0001 g.

3.3.5 Preparation of Inactive Samples for the Aging Experiment III

This experiment was planned to obtain information on the aging of material over a short time period (2-10 days) on a U - Pu solution without fission products. The reference solution R, (see Par. 3.2.1), was used for this experiment.

About 1.2 g of the spike solution S (see Par. 3.2.3) was weighed in advance (date 14.06.72) in each of the three vials no. 137-138-139. Two, six and ten days after the date of preparation (13.06.72) of the solution R about 1 g of this solution R was added in each vial. The date quoted for the preparation of the reference solution R was the date of mixing of the Pu and U reference solutions. These vials were closed and packed after addition of hydroxylamine and heating to 80°C like it was done for the solution R_s in the standard experiment. The masses of R and S solutions and dates of preparation are given in Table 3-3.

Table 3-3

No. of vial	Mass of solution [g]	Date	Mass of solution R [g]
137	1.2124 ± 0.0001	15.06.72	1.1214 ± 0.0001
138	1.2179 ± 0.0001	19.06.72	1.1490 ± 0.0001
139	1.2073 ± 0.0001	23.06.72	1.1302 ± 0.0001

The fraction of the solution R remaining in the vial 149 after the preparation was weighed. The weight of the vial filled with solution was 18.5674 g. The mass of solution in the vial was 5.5692 ± 0.0001 g.

3.3.6 Preparation of Active Samples for the Aging Experiment III

This experiment had the same aim as the aging experiment on the R solution (see Par. 3.3.5), but instead of R, the diluted active feed solution A prepared by EUROCHEMIC (date 21.06.72) was used. The spiking was done under the same conditions as for the solution R.

The masses of A and S solutions and dates of preparation are given in Table 3-4.

Table 3-4

No. of vial	Mass of solution S [g]	Date	Mass of solution A [g]
140	1.2133 ± 0.0001	23.06.72	1.6660 ± 0.0001
141	1.2170 ± 0.0001	26.06.72	1.6459 ± 0.0001
142	1.2005 ± 0.0001	30.06.72	1.5797 ± 0.0001

The fraction of A solution remaining in the vial 229 was weighed. The weight of the vial filled with solution was 18.8989 g.

3.3.7 Preparation of Samples for the Aging Experiment I

It was intended to study the dependency of aging effects on the molarity of the acid solution over a time interval of some months.

A fraction of the spike solution S (see Par. 3.2.3) was weighed (14.06.72) in the three vials no. 143 - 144 - 145.
At a same date (22.06.72) a fraction of each of three different active feed solutions D (molarity 2.5, 5 and 8 M) prepared by EUROCHEMIC was added to the corresponding vial. After addition of hydroxylamine and heating to 80°C the vials were closed and packed.
The masses of S and D solutions are given in Table 3-5.

Table 3-5

No. of vial	Mass of solution S [g]	Mass of solution D [g]
143	2.8614 ± 0.0001	1.7170 ± 0.0001
144	2.8424 ± 0.0001	2.1704 ± 0.0001
145	2.8392 ± 0.0001	2.1422 ± 0.0001

Vials containing aliquots of the different solutions D were weighed and packed for distribution to the laboratory performing the experiment I. The weights of the vials filled with solution are given in Table 3-6. The laboratory was asked to spike aliquots of these D solutions from time to time using the delivered spike solution S (see Par. 3-4).

Table 3-6

No. of vial	Reference	Molarity	Weight of vial with solution
272	D_u -1	2.5	20.9345
273	D_u -2	2.5	18.2492
275	D_u -3	5	21.1122
276	D_u -4	5	19.0012
278	D_u -5	8	22.5244
279	D_u -6	8	18.9098

3.3.8 Preparation of Samples for the Aging Experiment II

It was intended to study the dependency of aging effects on the Pu concentration over a time interval of some months. Different aliquots of the spike solution S were weighed (14.06.72) in the three vials no.146 - 147 and 148.

At the same date (22.06.72) a fraction of each of three different active feed solutions C (concentration 2, 10 and 20 µg Pu/ml) prepared by EUROCHEMIC was added to the corresponding vial. After addition of hydroxylamine and heating to 80°C the vials were closed and packed. The masses of S and C solutions are given in Table 3-7.

Table 3-7

No. of vial	Mass of solution S [g]	Mass of solution C [g]
146	1.3379 ± 0.0001	6.2205 ± 0.0001
147	2.8640 ± 0.0001	2.4032 ± 0.0001
148	4.0156 ± 0.0001	1.9800 ± 0.0001

Vials containing aliquots of the different solutions C were weighed and packed for distribution to the laboratory performing the experiment II (further spiking from time to time as in Par. 3-7).
The weights of the vials filled with solution are given in Table 3-8.

Table 3-8

No. of vial	Reference	Concentration [µg Pu/ml]	Weight of vial with solution
281	C_u -1	2	21.4450
282	C_u -2	2	20.3377
284	C_u -3	10	21.9872
285	C_u -4	10	19.7012
287	C_u -5	20	22.0266
288	C_u -6	20	19.6082

Acknowledgements

The sample preparation for the IDA-72 experiment was coordinated by Y. Le Duigou.

The determination of the isotopic compositions as well the assay of the spike solution by isotope dilution mass spectrometry were performed by P. De Bièvre.

The mass determinations were done by J. Brulmans.

The entire chemical preparation, aliquoting and packing of the samples was done by W. Leidert.

The participation of many CBNM collaborators, for some of them more than one month, was required to carry out this task. To all personnel involved many thanks.

The authors wish to thank specially M. Gallet for his assistance in the mass spectrometry measurements, M. Hendrickx for the weighing during the preparation of the samples, M. De Buck for his assistance in the health physics and transport and M. van Hengel for his help in many manipulations.

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4. Sample Preparation for the "Dry Spike Technique"

by

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The dry spike technique is part of the experiment and consists of two main parts:

a) preparation of the "dry spike"

b) spiking of the safeguards sample

a) the calibrated spike solution (preparation is described in Chapter 3) was used

1) an empty Sovirel tube was tare weighed on a semi-micro balance

2) 1 ml of the spike solution containing 10 micrograms Pu-242 and 1 mg U-233 was measured by a multidosimate E 415 burette and filled into the tube

3) the tube was gross weighed on a semi-micro balance

4) 20 spikes were prepared in this manner

5) the spikes were placed in an aluminium block and carefully evaporated to dryness which required about 20 hours

6) the vials with the dried spikes were tare weighed on a semi-micro balance

In the case of a safeguards inspection operation the inspector brings his set of calibrated "dry spikes" to the facility (i.e. reprocessing plant)

b) 7) a 1 ml portion of the diluted sample was added to each spike by an Eppendorf pipette

8) the tubes were gross weighed on a semi-micro balance

9) samples and spikes were evaporated according to 5)

10) the vials containing dry spike and dry sample mixture were closed and prepared for shipment

The subsequent treatment for the "dry spiked" sample will be the addition of 2 ml 5-8M nitric acid and heating until gentle boiling to dissolve spike and sample. The valency adjustment is made according to the individual procedures of the laboratory followed by their own separation procedure.

5. Preparation of Samples for the Aluminium-Capsule-Experiment in the Framework of the IDA-72 Experiment

by

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5.1 Objectives

The storage-stability of samples taken from dissolved irradiated fuels is influenced by radiolysis which may lead firstly to a loss of solvent and a change of concentration in the sample, and secondly a plating of plutonium on the walls of the container may occur because of a depletion of acid. To avoid these problems we tried, as part of the IDA-72 experiment, the described technique of sample conditioning. An aliquot of the sample or spike solution was weighed in an aluminium capsule. The solution was then carefully dried, precaution being taken that no spattering during evaporation had occured. Later, the aluminium capsule is closed. For the subsequent analysis the container together with the evaporated sample is dissolved. This gives the advantage that all the material of the sample is made available for the analysis. Storage of samples over longer periods becomes possible.

5.2 Sample Preparation

For the experiment three kinds of samples had to be prepared:

a) 16 capsules containing an aliquot of about 1 ml sample solution "A" and 1 ml spike solution.

b) 16 capsules containing an aliquot of about 1 ml sample solution "A"

c) 8 capsules containing an aliquot of 1 ml spike solution.

Procedures used for a) :

1. 8 preweighed aluminium-capsules were inserted into an aluminium-block and filled carefully with 1 ml of sample solution "A". (Eppendorf pipettes 1 ml)

2. Each of the capsules was weighed again.

3. The aluminium-block was heated up to 80°C. To speed up the evaporation a stream of filtered air was passed over the surface of the solutions /Fig. 5-1/. About two hours were needed to completely evaporate the samples.

4. After a cooling time of half an hour the capsules were weighed again.

5. 1 ml of the spike solution was pipetted into each capsule which was weighed once more.

6. The drying-step(3.)was repeated.

7. The capsules were carefully closed with pincers, put into plastic cans and welded into plastic bags.

Procedures used for b) and c) :

For the capsules referring to point b) and c) the procedure described above was applied except for the steps 4. to 6.

5.3 Dissolution of the Samples

The Al-capsule is placed in a cleaned, preweighed conical glass flask of 300 - 500 ml. A few drops of saturated $Hg(NO_3)_2$ solution are placed on the can and 10 ml of 7 M HNO_3 are added. To initiate the reaction the flask is warmed up gently. The reaction starts suddenly. After the reaction becomes less vigorous, the flask is filled up to about 20 ml with 7 M HNO_3 and is heated until complete dissolution of the capsule. (This can take up to 5 hours.) Finally, 10 ml H_2O are added to prevent cristallisation of aluminium-nitrate during cooling. The flask is weighed and an aliquot is taken for analysis.

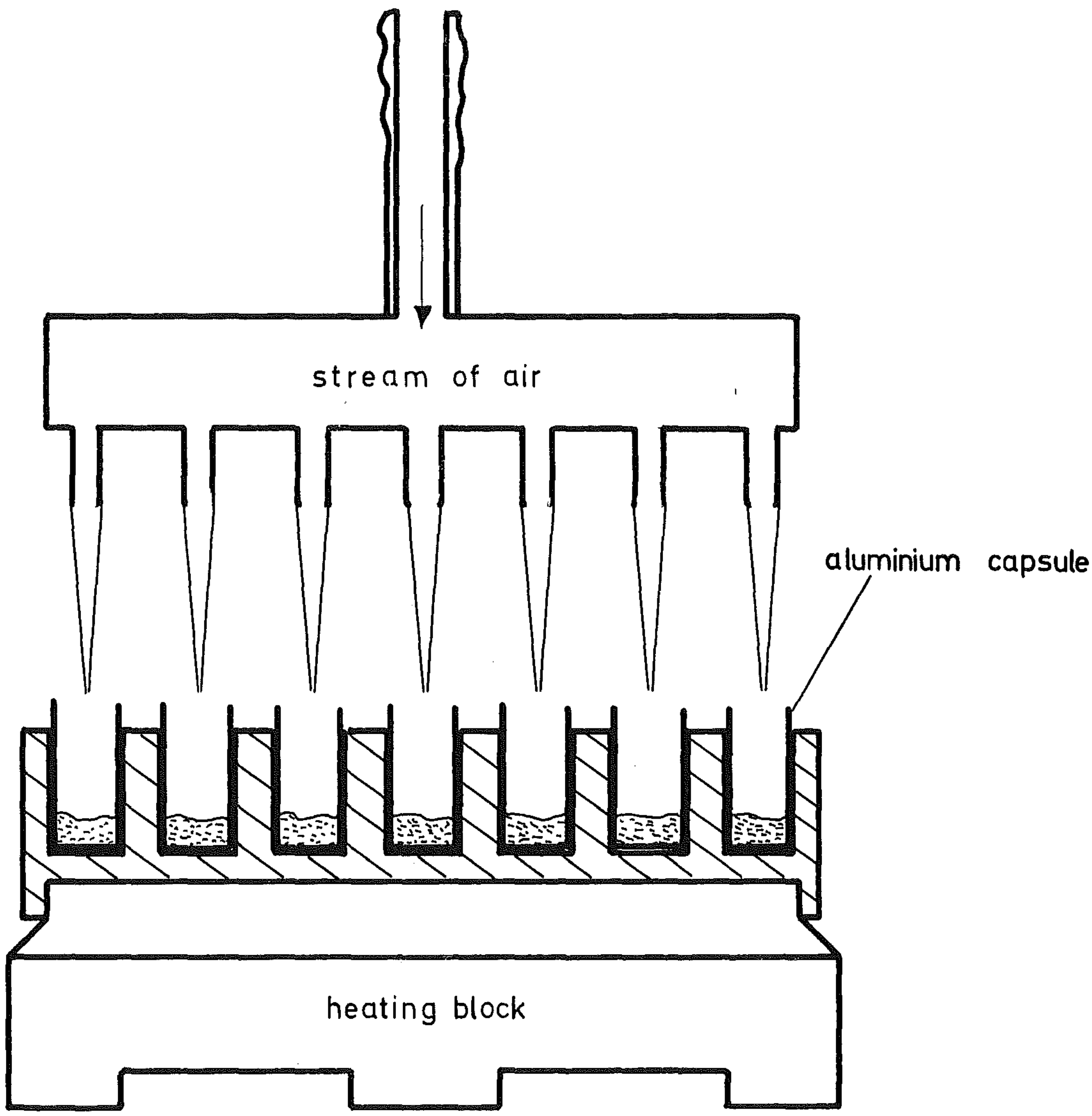

Fig. 5-1 Setup for Evaporation of Sample Solutions

Further conditioning of the sample can follow any appropriate standard procedure, which is not affected by excessive aluminium nitrate. We are applying a method described in /6/.

Reagents

$Hg(NO_3)_2$ p.a.

7 M HNO_3 quartz distilled

H_2O quartz distilled

6. Chemical Treatment of Samples and the Attempt of Interpreting the Results

by

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It is known that in mass spectroscopic isotope dilution analysis the exchange of isotopes between the sample and spike solutions constitutes a fundamental condition as soon as chemical separation steps are required in the analysis.

While such an exchange is relatively easily attained in the case of uranium, difficulties are more frequently encountered in the case of plutonium.

The polymerization of Pu-IV ions which may be present both in the sample and in the spike solutions quite often inhibits complete oxydation and reduction, respectively. However, the process is based on the possibility of an isotope exchange between the two initial solutions brought about by specific redox steps. Good working conditions can be achieved in a number of ways.

The significant steps of analysis for the chemical preparation techniques used in the IDA 72 experiment by the individual laboratories are summarized in Table 6-1.

It appears from the table that both ferrous solutions and hydroxylamine solutions are used for reduction. Most of the laboratories use Na_2NO_2 for oxydation, two of them use $HClO_4$.

To separate uranium and plutonium the ion exchange reaction is preferrably employed. Four laboratories apply solvent extraction.

A relationship cannot be established between the methods and the quality of results, the more so, since in most cases own analytical rules are applied and detailed data would be required to allow a judgement to be made. Only six laboratories rely on prescriptions taken from the literature.

It should be mentioned in this context that unlike the previous rules the new issue of ASTM E 267-70 published in 1972 includes a detailed discussion in the chapter devoted to isotope exchange. No laboratory observed this prescription.

Table 6-1

Code Nr.	Reduction	Oxidation	Separation	Lit. Data
2	without chem. prep.	-	-	without literature data
3	$NH_2OH \cdot HCl$ in HCl after addition of tracer	HNO_3 -	Ion Exchange 8 M HNO_3-System	without literature data
4	ferrous-ammonium-sulfate allow to stand for 5 min	$NaNO_2$ -	Ion Exchange 8 M HNO_3-System	ASTM E 267-67 T
5	$2NH_2 \cdot OH \cdot SO_4$ allow to stand by 60°C 1 hour	HNO_3 -	Ion Exchange 8 M HNO_3-System	without literature data
6	$NH_2OH \cdot HCl$ allow to stand for 10 min	$NaNO_4$ -	Ion Exchange 8 M HNO_3-System	without literature data
7	$NH_2OH \cdot HCl$ in HCl evaporate to dryness	HNO_3 -	Ion Exchange 8 M HNO_3-System	Webster et al, Anal. Chim.Acta 24 (1961) and Hemlin et al, Anal.Chim.Acta 33 1547 (1961)
8	ferrous-ammonium-sulfate allow to stand for 5 min	$NaNO_2$	Ion Exchange 8 M HNO_3-System	GEAP 5354
10	Red-Ox-System not described	-	Solvent Extraction	without literature data
12+	without Red-Ox-System Oxidized with $HClO_4$	$HClO_4$	Ion Exchange 12 M HCl-System	IAEA/SM 149 (71)

+ Spiked sample solutions, which contained NH_2OH, were evaporated twice with 16 M HNO_3 before the chemical treatment to destroy organic residues.

Table 6-1 cont.

Code Nr.	Reduction	Oxidation	Separation	Lit. Data
13	$NH_2OH \cdot HCl$ no comment	$NaNO_2$	Ion Exchange 8 M HNO_3-System	without literature data
14	$HClO_4$ evaporation	$HClO_4$ -	Ion Exchange 12 M HCl-System	without literature data
15	$NH_2OH \cdot HCl$ allow to stand for 20 min by 60°C	$NaNO_2$	Solvent Extraction HNO_3	without literature data
17	ferrous solution allow to stand for 5 min	$NaNO_2$ -	Ion Exchange 7.5 M HNO_3-System	ASTM E 321-67 T
18	Fe_2-Ion and NH_2OH no comment	$NaNO_2$	Ion Exchange 7-8 M HNO_3-System	without literature data
19	$NH_2OH \cdot HCl$ ferrous sulfamat stabilized	$NaNO_2$	Solvent Extraction	
20	ferrous solution $NaNO_2$ allow to stand for 5 min	$NaNO_2$	Ion Exchange 7.5 M HNO_3-System	ASTM E 321-67 T
21	$NH_2OH \cdot HCl$ no comment	HNO_3	Ion Exchange 7 M HNO_3-System	without literature data
23	-	-	no separation	without literature data

It need not be stressed that with the small analytical quantities involved there is a particularly high risk of cross contamination.

In this report an attempt is made to analyse the results with a view to these two sources of error.

Since errors in the isotope exchange are anticipated in spiked solutions only and, as already said, the exchange of plutonium isotopes raises some problems, only results for plutonium in spiked solutions will be discussed here.

Tables 6-2 to 6-4 show the atom ratios Pu-242/239, 240/239, and 241/239 listed together with the respective relative standard deviations RSD of the laboratory mean values - calculated from the values of the three "runs" - and the differences RD between the laboratory mean values and the mean of all laboratory mean values relative to this mean of all mean values. The means of all laboratory mean values are calculated without the values in brackets. The reason for this omission was that in these cases the ratio Pu-242/239 was an outlier for the laboratory in question and it seemed meaningful to do the calculation for the same group of laboratories for all the isotopic ratios. For a better understanding of the results, the correlation of the atom ratio and the relative standard deviations of the three "runs" for the different laboratories are shown in Figures 6-1 to 6-3.

It seems that three different sources of error can be concluded from these values.

In the case of laboratory 8 it is seen that the RSD of the laboratory mean varies much more than for other laboratories. The striking fact is that in this case all isotope ratios show deviations of the same order of magnitude.

If the possibility also exists to observe the deviation of the individual scans, it becomes obvious that they introduce a great error into the analysis. A great deviation of the scans should indicate poor performance of the mass spectrometer.

Evidently, the results of laboratory 21, sample R_s, reveal a different error. In this case the relative standard deviation within the laboratory for Pu-242/Pu-239 takes a very good value (0.10%). All other values determined statistically, such as the RSD of the run and even of the scans, are very good. When, however, the result is compared to the mean value calculated from the values submitted by the other laboratories, a deviation of 40% is found. Since the other isotope values for the R_s sample are also considerably shifted - Pu-240/239=100% and 241/239=337% - this should be a typical example of cross contamination which, however, can hardly be discovered by the laboratory itself.

Table 6-2 Sample A_s

Lab Code	242/239	RSD (%) Lab Mean	RD (%)**)	240/239	RSD (%) Lab Mean	RD (%)**	241/239	RSD (%) Lab Mean	RD (%)**
2	1.302	0.23	± 0.00	0.2351	0.13	0.26	(0.1299)	0.93	2.36
3	1.307	0.07	0.38	0.2355	0.19	0.43	0.1263	0.35	- 0.47
4	(0.818)	8.82	-37.17	(0.2286)	0.51	- 2.52	(0.1230)	3.06	- 3.07
5	1.298	0.80	- 0.31	0.2340	0.20	- 0.21	0.1257	0.49	- 0.95
6	1.301	0.32	- 0.08	0.2353	0.10	0.34	0.1270	0.17	0.08
7	1.304	0.21	0.15	0.2351	0.16	0.26	0.1274	0.24	0.39
8	(0.935)	3.50	-28.42	(0.2328)	1.03	- 0.72	(0.1289)	1.31	1.58
10	1.321	0.43	1.46	0.2349	0.14	0.17	0.1281	0.50	0.95
12	1.304	0.18	0.15	0.2345	0.22	± 0.00	0.1268	0.13	- 0.08
13	1.302	0.01	± 0.00	0.2337	0.06	- 0.34	0.1261	0.21	- 0.63
14	1.309	0.07	0.54	0.2341	0.13	- 0.17	0.1279	0.17	0.79
15	1.293	0.23	- 0.69	0.2337	0.09	- 0.34	0.1273	0.02	0.32
17	1.297	0.13	- 0.38	0.2348	0.44	0.13	0.1263	0.40	- 0.47
18	1.304	0.04	0.15	0.2341	0.15	- 0.17	0.1267	0.18	- 0.16
19	1.306	0.10	0.31	0.2351	0.05	0.26	0.1268	0.19	- 0.08
20	1.310	0.06	0.61	0.2336	0.25	- 0.38	0.1251	0.53	- 1.42
21	1.277	0.22	- 1.92	0.2344	0.15	- 0.04	0.1255	0.18	- 1.10
	1.302 *)			0.2345 *)			0.1269 *)		

*) Mean of laboratory means calculated without values in brackets. For the ratio 241/239 the value from laboratory 2 was also omitted because this laboratory had not performed a separation of Am.

**) Difference between laboratory mean and mean of all laboratory means relative to the mean of all laboratory means.

Table 6-3 Sample B_s

Lab Code	242/239	RSD (%) Lab Mean	RD (%) **)	240/239	RSD (%) Lab Mean	RD (%)	241/239	RSD (%) Lab Mean	RD (%)
2	1.302	0.33	0.85	0.2350	0.05	0.34	(0.1344)	0.43	6.25
3	1.295	0.05	0.31	0.2364	0.20	0.94	0.1269	0.13	0.32
4	(0.898)	9.12	- 30.44	(0.2348)	0.34	0.26	(0.1264)	0.31	- 0.08
5	1.281	0.55	- 0.77	0.2336	0.33	- 0.26	0.1251	0.48	- 1.11
6	(1.166)	0.34	- 9.68	(0.2333)	0.71	- 0.38	(0.1262)	0.97	- 0.24
7	1.286	0.21	- 0.39	0.2327	0.24	- 0.64	0.1256	0.42	- 0.71
8	(1.122)	3.30	- 13.09	(0.2375)	0.61	1.41	(0.1276)	1.36	0.87
10	1.300	0.21	0.70	0.2340	0.08	- 0.09	0.1270	0.23	0.40
12	1.288	0.15	- 0.23	0.2342	0.04	± 0.00	0.1268	0.09	0.24
13	1.291	0.03	± 0.00	0.2341	0.03	- 0.04	0.1259	0.26	- 0.47
14	1.291	0.16	± 0.00	0.2339	0.17	0.13	0.1275	0.20	0.79
15	1.275	0.15	- 1.24	0.2325	0.63	- 0.73	0.1270	0.39	0.40
17	1.296	0.25	0.39	0.2345	0.10	0.13	0.1267	0.15	0.16
18	1.287	0.06	0.31	0.2335	0.14	- 0.30	0.1262	0.12	- 0.24
19	1.292	0.07	0.08	0.2351	0.07	0.38	0.1267	0.16	0.16
20	1.298	1.06	0.54	0.2355	1.53	0.56	0.1262	2.31	- 0.24
21	(1.206)	0.32	- 6.58	(0.2342)	0.12	± 0.00	(0.1247)	0.25	- 1.42
	1.291 *)			0.2342			0.1265		

*) Mean of laboratory means calculated without values in brackets. For the ratio 241/239 the value from laboratory 2 was also omitted because this laboratory had not performed a separation of Am.

**) Difference between laboratory mean and mean of all laboratory means relative to the mean of all laboratory means.

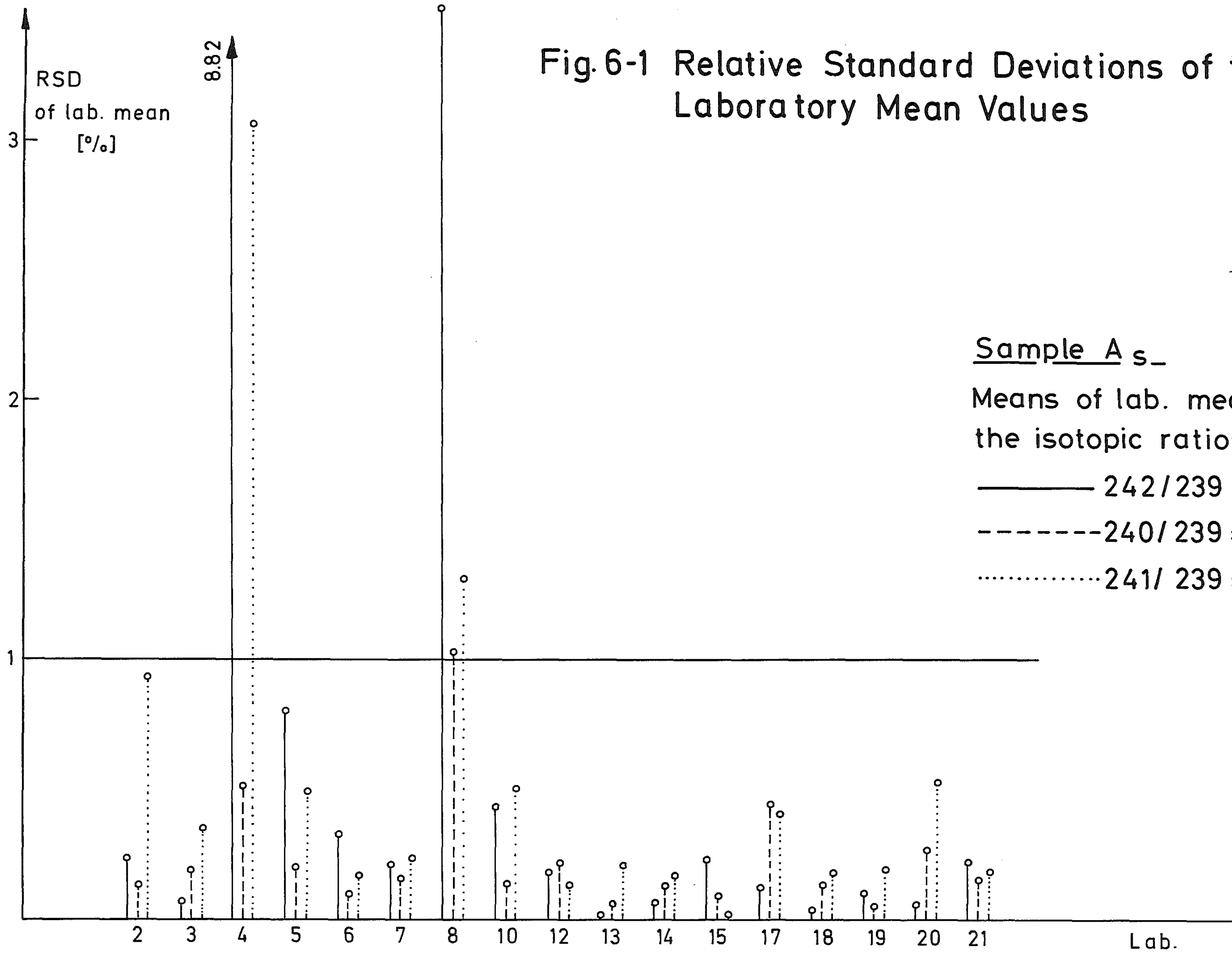
Table 6-4 Sample R_s

Lab Code	242/239	RSD (%) Lab Mean	RD (%) **)	240/239	RSD (%) Lab Mean	RD (%)	241/239	RSD (%) Lab Mean	RD (%)
2	1.181	0.39	1.20	0.03324	0.16	0.73	(0.0025)	4.88	21.36
3	1.173	0.07	0.51	0.03324	0.16	0.73	0.0020	4.75	- 2.91
4	(1.115)	0.88	- 4.46	(0.03292)	1.19	- 0.24	-	-	-
5	1.154	0.21	- 1.11	0.03338	0.75	1.15	0.0021	1.60	1.94
6	(1.033)	1.13	-11.48	(0.03350)	0.12	1.52	(0.0020)	0.97	- 2.91
7	1.166	0.16	- 0.09	0.03275	0.91	- 0.76	0.0020	1.36	- 2.91
8	(1.067)	3.39	- 8.57	(0.03587)	4.37	8.70	(0.0023)	3.58	11.65
10	1.174	0.28	0.60	0.03289	0.09	- 0.33	0.0020	0.35	- 2.91
12	1.168	0.11	0.09	0.03290	0.19	- 0.30	0.0022	0.94	6.80
13	1.168	0.04	0.09	0.03277	0.33	- 0.70	0.0019	2.49	- 7.77
14	1.171	0.17	0.34	0.03312	0.23	0.36	0.0020	0.13	- 2.91
15	1.160	0.37	- 0.60	0.03288	0.40	- 0.36	0.0020	3.39	- 2.91
17	1.172	0.05	0.43	0.03294	0.26	- 0.18	0.0020	0.46	- 2.91
18	1.164	0.02	- 0.26	0.03291	0.08	- 0.27	0.0020	0.21	- 2.91
19	1.163	0.09	- 0.34	0.03303	0.13	0.09	0.0020	0.16	- 2.91
20	1.160	0.32	- 0.60	(0.03227)	0.41	- 2.21	(0.0017)	2.68	- 17.48
21	(0.701)	0.10	-39.93	(0.06662)	0.48	101.9	(0.0091)	0.14	337.2
	1.167 *)			0.03300			0.00206		

*) Mean of laboratory means calculated without values in brackets. For the ratio 241/239 the value from laboratory 2 was also omitted because this laboratory had not performed a separation of Am.

**) Difference between laboratory mean and mean of all laboratory means relative to the mean of all laboratory means.

Fig. 6-1 Relative Standard Deviations of the Laboratory Mean Values



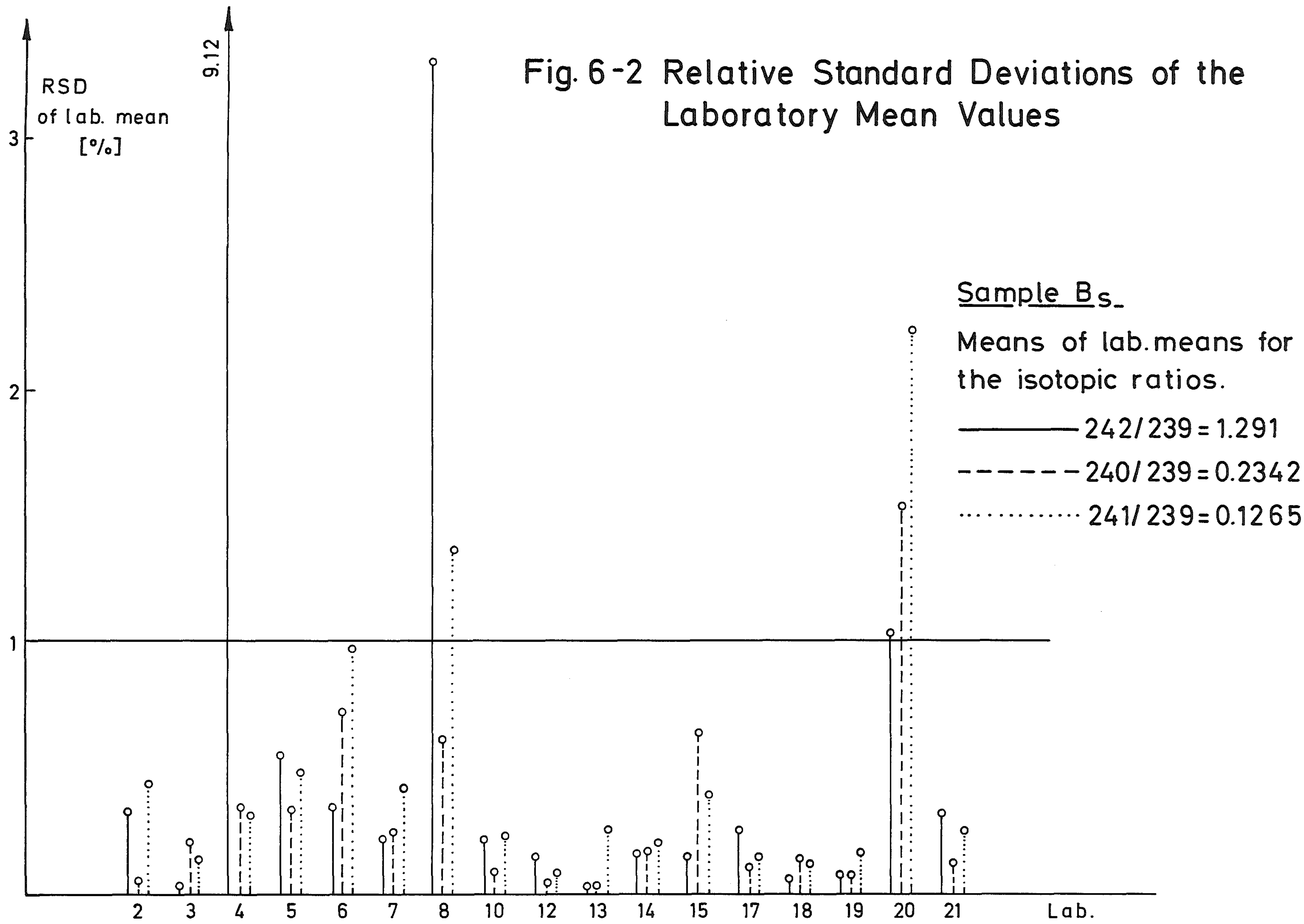


Fig. 6-2 Relative Standard Deviations of the Laboratory Mean Values

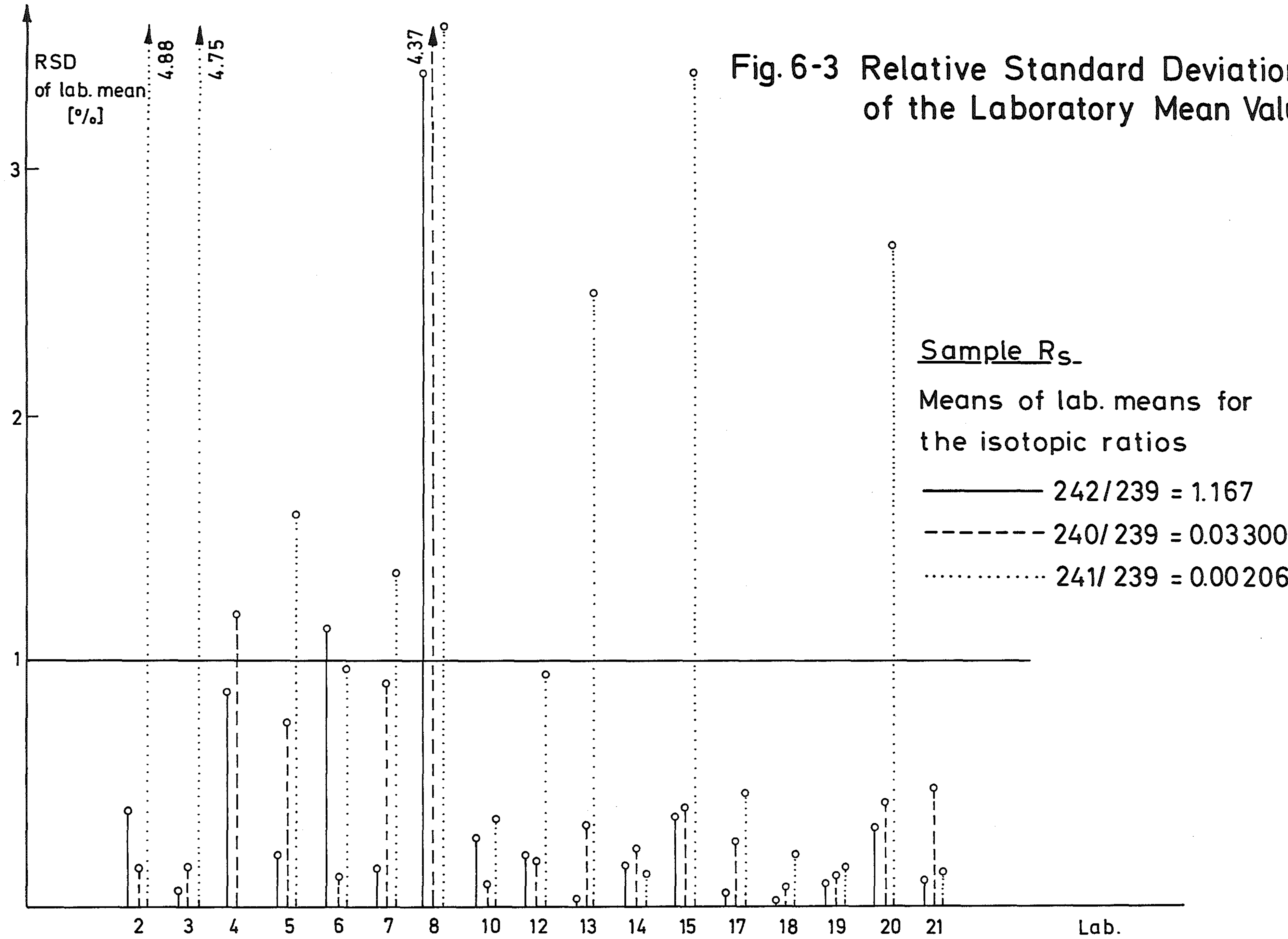


Fig. 6-3 Relative Standard Deviations of the Laboratory Mean Values

The results from laboratory 4, especially of the samples A_s and B_s, differ in another way with respect to their deviations. The relative standard deviation for the Pu-242/239 isotope ratio amounts to 8.8 and 9.1 %, respectively, within the laboratory, while the other isotope ratios show RSD values of 0.51 % and 0.34 % for Pu-240/239 and of 3.06 % and 0.31 % for Pu-241/239. In this case the analysis of variances for the single measurements of the Pu-242/239 ratio gives 0.5 % and 0.8 %, respectively, for the scan components and 15.3 % and 15.8 % for the run components of the RSD. Here it is noticeable that the deviations of the runs amount to 0.8 % and 0.4 %, respectively, for the Pu-240/239 isotope ratios, i.e., they attain the usual orders of magnitude, so that these results are an indication of insatisfactory isotope exchange.

Similar results are reported by another laboratory. Therefore, the comments will be quoted here:

> "While the analysis of all the samples in the standard experiment went on smoothly there was some problem in the Pu-242/Pu-239 ratio of plutonium samples A (spiked) and B (spiked). Following the ASTM-E-321-67[T] procedure, the three separate aliquots from each sample were subjected to the procedure which consisted of
>
> (1) addition of ferrous ammonium sulphate
> (2) addition of sodium nitrite and
> (3) anion exchange separation in 7.5 M nitric acid.
>
> The mass spectrometric scans of plutonium showed that two chemical preparations from sample A (spiked) and two from sample B (spiked) gave atom ratios Pu-242/Pu-239 which agreed well between themselves. The third preparations from both samples gave very different Pu-242/Pu-239 ratios as can be seen from the separate data sheets. In the fourth chemical preparation both these samples were prepared following the same procedure but more carefully and the Pu-242/Pu-239 ratio was again different. This tempted us to suspect that either the ASTM procedure was inadequate or Pu-242 in the dissolver solutions did not completely exchange with the other isotopes, since the values of only Pu-242/Pu-239 had shown difference (and other ratios were alright). Therefore, we decided to subject the small portions of the samples still remaining in the vials to a thorough procedure which would bring about depolymerisation of any polymer that may exist and also complete exchange between

the spike Pu-242 and other isotopes in case it was not complete earlier. To achieve this objective, ferrous ammonium sulphate and sodium nitrite were added to the vials and the solutions evaporated, concentrated nitric acid was added and the ferrous-nitrite treatment was repeated before anion exchange separation was carried out. The values of Pu-242/Pu-239 obtained from these solutions agreed very well with the values in the first two analyses. This shows that there was no polymer sticking on to the walls of the vial. We do not completely understand the reason for this type of results but the values of Pu-242/Pu-239 obtained in first, second and fifth chemical separations seem to be reliable and correct since the last sample was obtained by directly treating the solution in the vial itself. We would have to wait till we know the experience and results of others."

The laboratory did well to distrust the two values. If in the case of the ratio Pu-242/Pu-239 all five runs instead of three runs are taken into consideration the run component of the RSD rises from 0.13 % to 12 % for sample A_s and from 0.41 % to 11 % for sample B_s. In contrast to this the RSD components for the determination of the ratio Pu-240/Pu-239 remain in the same order of magnitude also if one includes all five runs, i.e. the values are 0.74 % (3 runs) and 0.89 % (5 runs) for the sample A_s and 0.13 % (3 runs) and 0.16 % (5 runs) for the sample B_s. Since the spike solution contained practically no Pu-240 and this effect remains restricted to the ratio Pu-242/Pu-239 it is evident that the difficulty lies in the mixture of sample and spike plutonium.

It is not easy to interpret the results provided by laboratory 6. It is surprising that for the high Pu-242/239 isotope ratio the relative standard deviation of the scans is of the order of magnitude of 2.3 to 3.3 % for all spiked samples *). This laboratory gave the information that the amount of available Pu was much smaller than normally used, which explains the moderate reproducibility. This depends on the quality of the mass-spectrometer. Nevertheless, the results of the sample A_s is good. With respect to the sample B_s the RSD is equally good (0.33 %) for the Pu-242/239 ratio within the laboratory, so that in this case there was

*) It should be noted that for the laboratory the normal numerical analysis of scan values is not fully adequate since the special scanning procedure of this laboratory would actually require a grouping of values before the calculations.

neither a reason for the laboratory to reject the values; also the analysis of variances gave negligible error components for the runs. Contrary to that, the respective values for the R_s-sample were of the order of 1 % for the high abundant Pu-242 isotope which means that the results of this very laboratory show the limits set to the assignment of errors.

As appears from the short report, it is difficult to establish a relationship between the chemical working technique and the results. It seems, however, that somewhat better information can be obtained by statistical evaluation of the individual results.

Major deviations of the individual values revealed by the relative standard deviation of the scans might be an indication of faulty performance of the mass spectrometer.

Large variations between the individual runs, which are observed only between the spike isotope and the main isotope, should in most cases be attributable to poor exchange of isotopes. Cross contamination should be the most difficult thing to discover inside one laboratory.

7. Corrections for Mass Discrimination

by

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7.1 Introduction

At the beginning of the IDA-experiment, the participating laboratories were requested to report the isotopic ratios corrected for mass discrimination according to the method normally used.

As far as concentration determinations are concerned, errors due to mass discrimination are compensated under the condition that the spike solution is calibrated by the same individual laboratory which performs the analysis. With the exception of the "Self spike experiment", this was not the case in IDA-72. Nevertheless, in the evaluation of the other parts of the experiment, compensation of this correction factor could be obtained by considering the results of the A- and B-solutions relative to those of the R-sample /Vol. I, Par. 3.5.1/.

However, corrections for mass discrimination are always necessary

- if the spike solution used for the isotope dilution analysis is not calibrated by the laboratory itself and if no analysis of a suitable known reference sample exists, and

- for all isotopic ratio or relative isotopic abundance determinations.

The exact determination of the correction factors for plutonium is specificly complicated by the lack of suitable isotopic standards for this element.

In this context it should be mentioned that the error caused by the mass discrimination effect (in the wide sense as it is usually understood) can be corrected only partly by the calibration with standards, as errors due to changes in the instrumental operating conditions from the filament loading with the standard to the one with the sample remain unaffected /Vol. I, Chapter 8/.

7.2 Inquiry on the Methods Used.

In order to obtain a survey on the methods used by the individual laboratories questionnaires were sent to the participants. They were answered by 17 laboratories. The questions together with the information obtained is given in the following. It corresponds to the final status on which this report is based. It was not possible to indicate the individual laboratories which used the various methods as this would lead to a partial revealing of the codes.

A. Were the isotopic ratios reported for IDA-72 corrected for mass discrimination?

	Yes	No	No information
Number of laboratories:	17*)	-	2 (labs 16 + 23)

B. Are the correction factors applied in your laboratory considered as independent of the magnitude of the isotopic ratio?

	Yes	No	No information
Number of laboratories:	10	2	7

C. Uranium measurements:

Correction methods used:	Number of laboratories
a) Calibration with NBS-standards (005, 010, 020, 050, 350, 500, 930 and 950 A were reported)	12
b) Correction with $\sqrt{\frac{m_1}{m_2}}$	1
c) No information on the method applied	4

---

*) Laboratories 4 and 20 for U-measurements only.

The values reported for the correction of the U-233/U-238 ratio are:

- 1.0 % in average,

- 2.0 % at maximum.

D. Plutonium measurements.

Correction methods used:	Number of laboratories
a) Calibration with U-standards:	7
b) Calibration with NBS Pu-948	2
c) Correction with $\sqrt{\frac{m_1}{m_2}}$	2
d) No information on the method applied	4

The values reported for the correction of the Pu-242/Pu-239 ratio are:

+ 0.6 % in average

+ 1.2 % at maximum.

8. Determination of Pu-238 by α-Spectrometry for the IDA - 72 Experiment

by

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8.1 Introduction

In the framework of the IDA-72 experiment, it was decided to perform α-spectrometric determination of Pu-238 in each of the following spiked and unspiked samples:

- active feed solution A

- active feed solution B

- reference solution R

The laboratories participating in the experiment were asked to perform three repetitive measurements for the unspiked samples A_u, B_u and R_u. In the case of the spiked samples A_s, B_s and R_s, the laboratories had to divide the samples into three parts and to perform one measurement for each of the three parts. Consequently a total of six results were given by each of the 11 laboratories which performed the measurements.

This chapter reports and discusses the procedures and the results of the Pu-238 α-spectrometric determination.

8.2 Procedures

A questionnaire was sent to the laboratories involved in the α-spectrometric measurements for information on procedures and instruments used. The questions dealt with:

- method of alpha source preparation
- material used for the source support
- type and manufacturer of the instrument used
- detector resolution (FWHM)
- reproducibility of the measurements.

From the answers it results that the most frequent method used for the preparation of the alpha source is the direct evaporation of a solution drop (7 laboratories). Three laboratories used the electro-deposition method; one laboratory (code 18) used the method of Kirby.

As source support, six laboratories used stainless steel discs, three tantalum discs and two platinum ones.

Pre-amplifiers, linear amplifiers and multi-channel pulse height analyzers were used by the laboratories for the measurements. The equipment is commercially available with the exception of a few laboratories which used home made amplifiers.

Surface barrier detectors were used by all the laboratories. The detector resolution is, on average, about 20 KeV at 5.50 MeV. Detectors with lower resolution ($\sim$ 40 KeV) were used by three laboratories, one laboratory has used a very high resolution detector (8-9 KeV).

Only a few laboratories answered the question concerning the reproducibility of the measurements. Some laboratories have given a relative average deviation of $\pm$ 1 %.

8.3 Results

As it is known, the alpha decay energies of Pu-239 and Pu-240 overlap so that, after separation of the Am-241, only the alpha activity ratios Pu-238/(Pu-239 + Pu-240) can be determined. However, by use of the ratio Pu-240/Pu-239 determined by mass spectrometry, the isotopic ratio Pu-238/Pu-239 can be calculated.

For each laboratory, the mean of the alpha activity ratio Pu-238/(Pu-239 + Pu-240) and the Pu-238/Pu-239 isotopic ratio are listed in the report on the evaluation of data /Volume I, Par. 3.3.2/. Here, for brevity, for the alpha activity ratio and the calculated isotopic ratio, only the means of laboratory means together with the precision and the interlaboratory deviation are reported (Table 8-1).

A discussion of the results is given in the next paragraph.

Tab.8-1 Results of the Alpha Spectrometric Measurements.

Sample	Mean of lab. means for α-activity ratio $\frac{Pu\text{-}238}{Pu\text{-}239+Pu\text{-}240}$	Calculated isotopic ratio Pu-238/Pu-239	Precision RSD [%]	Interlab. deviation RSD [%]
A and B unspiked	2.191	0.01460	1.13	0.66
A and B spiked	2.145	0.01440	1.41	1.14
R unspiked	0.0117	0.00005	4.08	33.1
R spiked	0.0243	0.00010	4.49	15.7

Values calculated after rejection of outlier values as described in Vol. I, Par. 3.3.2.

8.4 Discussion

From the data reported in Table 8-1, it is evident that, in general, higher precision and lower interlaboratory deviations are obtained for the unspiked samples A, B and R. Moreover, a discrepancy between the alpha activity ratio for spiked and unspiked samples can be noted. The discrepancy, according to the layout of the standard experiment, cannot be attributed totally to the Pu-239 and Pu-240 content in spiked samples.

Generally speaking, the methods and procedures used by the different laboratories for the Pu-238 determination are equivalent and, therefore, should not be the source of very important differences. Nevertheless, some deviations may be caused by the different methods of treatment of alpha spectra data. Unfortunately, this point was not included in the questionnaire so that no information is available for further discussion.

The larger deviation observed for the spiked samples may be explained, perhaps, by the fact that these samples were divided into three parts. For each part a separate treatment was performed. In this case the risk of a cross contamination of the samples is increased; moreover, the Am-241 separation may be slightly different from sample to sample and, consequently, larger deviations can be obtained for the Pu-238 activity.

9. IDA-72: Concentration Determination by X-Ray Fluorescence Spectrometry

performed by

K. Matern [1)]

reported by

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In addition to the A, B and C samples used for the standard and aging experiments four further samples E_1 to E_4 were taken at EUROCHEMIC in the same sampling procedure on June 21st, 1972 /Chapter 2, Fig. 2-2/. On July 5th, the Institute of Radiochemistry of the GfK determined the uranium and plutonium concentrations on this undiluted sample material by X-ray fluorescence spectrometry. These analyses were performed without any chemical separation within one day /7/.

The laboratory reported 6 determinations for each of both elements, indicating one of the uranium determinations as an outlier. The means of these X-ray determinations and their relative standard deviations are compiled in the table together with the mean of the values calculated from the "best" concentration values obtained in the standard experiment by isotope dilution analyses. For the calculation of the concentrations of the undiluted sample material, the data on the dilution procedure, given in Chapter 2, Fig. 2-2 were used. Reference is also made to Vol. I, Par. 3.5.6.
All values are valid for 22°C (density 1.3790 g/ml).

Table: Concentration of Undiluted Sample Material

	Uranium		Plutonium	
	mean concentration [mg U/g sol.]	RSD of mean [%]	mean concentration [µg Pu/g sol.]	RSD of mean [%]
Standard exp. (mean of samples A and B)	164.11		1310.6	
x-ray fluorescence spectrometry	166.79	0.14	1309.1	0.25
Rel. deviation %	+ 1.6		- 0.1	

The positive deviation of the X-ray value for uranium might indicate that there was evaporation due to radiolysis of the high active undiluted sample material during the storage and transportation time of two weeks. However, this explanation does not fit with the good agreement of the plutonium results which are also confirmed by the process analysis of EUROCHEMIC /Vol. I, Par. 3.5.6/.

10. The Application of Outlier Criteria in the Evaluation of Measuring Results for IDA-72

by

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10.1 Introduction

At the begin of planning the IDA-72 experiment it was necessary to decide how many repetitions of measurements would be necessary and possible in order to allow a meaningful statistical evaluation under the constraint of reasonable efforts.

It was quite clear that the only point in the course of evaluation where a larger number of repetitions was possible was the number of mass spectrometer scans made for one filament loading (run). Already the number of such filament loadings would have to be limited to a maximum of three.

For the number of scans, i.e. of single determinations of all the isotopic ratios of one sample of a U or Pu solution loaded on a filament, it was decided to take 10 as a reasonable compromise.

This number would also allow to check the given series for wrong numbers which could originate from mistakes in reading or/and transmitting the data or other sources of error.

Since we did not know how often such mistakes would occur we decided to evaluate finally 8 scan values in order to have an orthogonal system which is important for the aim of analysis of variances. By this decision we had the possibility to omit outlier values or to take a random choice in order to reduce the number of 10 given values to 8 accepted values.

For discrimination of outlier the two criteria of Dixon /8-10/ and Chauvenet /11-14/ were taken into account. Other criteria are reported in Ref. /15/ and /16/. If no outlier could be detected just the first 8 of the 10 given values were taken - which means a random choice since the given measuring results were not ordered.

For studying the influence of the application of the outlier criteria the measurement results of 5 laboratories for the standard experiment were taken. This means that about 25 % of all given values were the basis for the decision which criterion should be applied for the whole data material.

The aim of the application of outlier criteria was defined as to detect strongly deviating measurement results with a low probability of error. Since it is the general objective of the experiment to analyse the accuracy of the method and the sources of errors it was important not to simulate a false precision by omission of too many "outliers".

10.2 Theoretical Considerations

10.2.1 Dixon Criterion

It is assumed that the measurements x_i are normally distributed. These values x_i are put into ascending order: $x_1 < x_2 \ldots . < x_n$. For test purposes quotients r_{ij} of differences between these ordered values involving x_n or x_1 are used (see below). The distribution functions of r_{ij} depend on n and cannot be given by an explicit expression. The criterium for elimination of a value is $r_{ij} > r_{1-\alpha}$. $r_{1-\alpha}$ is the significance threshold and is determined by $F_{r_{ij}}(r_{1-\alpha}) = \alpha$ for a given probability of error α. In this context "error" means that a measurement is excluded by mistake in spite of its belonging to the series. $F_{r_{ij}}$ are the distribution functions of r_{ij}.

10.2.2 Chauvenet Criterion

Also in this case it is assumed that the measurements x_i are normally distributed. Their expectation value shall be μ and the variance σ^2. In this case the expression $\frac{x_i-\mu}{\sigma}$ has a standardized normal distribution, i.e.

$$E\left(\frac{x_i-\mu}{\sigma}\right) = 0 \qquad \text{and}$$

$$\text{var}\left(\frac{x_i-\mu}{\sigma}\right) = 1$$

The distribution function of $\frac{x_i-\mu}{\sigma}$ is $\Phi = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{t^2}{2}} dt$. The probability that $\frac{x_i-\mu}{\sigma}$ deviates from 0 by more than x_c is given by

$$P\left(\left|\frac{x_i-\mu}{\sigma}\right| > x_c\right) = 1-P\left(-x_c \leq \frac{x_i-\mu}{\sigma} \leq x_c\right)$$

$$= 1-(\Phi(x_c)-\Phi(-x_c))$$

$$= 1-(2\,\Phi(x_c)-1)$$

$$= 2\,(1-\Phi(x_c))$$

A measurement is rejected if $\left|\frac{x_i - \mu}{\sigma}\right| > x_c$. The probability that the condition $\left|\frac{x_i - \mu}{\sigma}\right| > x_c$ is fulfilled, which means that also a correct measurement will be eliminated by mistake, is named P. For this latter reason it is also called probability of error. By the definition it is clear that P corresponds to the probability of error α defined in the case of the Dixon criterion. It is a convention to put $P = \frac{1}{2n}$ where n is the number of measurements x_i . So we have:

$$\frac{1}{2n} = 2\,(1-\Phi(x_c))$$

and

$$x_c = U\,(1-\frac{1}{4n})$$

where U is the inverse function of Φ.

10.2.3 Comparison

The premise for the application of the Chauvenet criterion is the knowledge of μ and σ. This condition is normally not fulfilled and, therefore, μ is replaced by $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$ and σ^2 by $s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i-\bar{x})^2$ as approximation. This procedure seems plausible because the expectation value of $\bar{x}$ is

$$E\,(\bar{x}) = \mu,$$

and that of s^2 is

$$E\,(s^2) = \sigma^2 .$$

It seems doubtful whether or not this procedure is justified in cases like ours, where only 10 values x_i exist and so one strongly deviating value x_i has a big influence on $\bar{x}$ and s^2. However, when the Dixon criterion is to be applied the knowledge of mean value and variance of the distribution of the measurements is not necessary since they do not affect the distribution function of the r_{ij}.

10.3 Practical Application of the Dixon and Chauvenet Criterion

10.3.1 Dixon Criterion

The rules for the application of this criterion are given in Ref. /8/.
In the following the application procedure is described stepwise:

1. step: The measurement values are ordered so that
   $x_1 \leq x_2 \leq \dots \leq x_n$

2. step: A probability of error α that a value is excluded by mistake is chosen.

3. step: Corresponding to the number of measurements n the following quotients of differences r_{ij} are calculated:

For	r_{ij}
$3 \leq n \leq 7$	r_{10}
$8 \leq n \leq 10$	r_{11}
$11 \leq n \leq 13$	r_{21}
$14 \leq n \leq 25$	r_{22}

with the following expressions for the r_{ij}

r_{ij}	x_1 suspicious	x_n suspicious
r_{10}	$\frac{x_2-x_1}{x_n-x_1}$	$\frac{x_n-x_{n-1}}{x_n-x_1}$
r_{11}	$\frac{x_2-x_1}{x_{n-1}-x_1}$	$\frac{x_n-x_{n-1}}{x_n-x_2}$
r_{21}	$\frac{x_3-x_1}{x_{n-1}-x_1}$	$\frac{x_n-x_{n-2}}{x_n-x_2}$
r_{22}	$\frac{x_3-x_1}{x_{n-2}-x_1}$	$\frac{x_n-x_{n-2}}{x_n-x_3}$

4. step: From the following table the numerical value $r_{1-\alpha}$ for the specific number of measurements is taken:

Table for $r_{1-\alpha}$

r_{ij}	n	$1-\alpha=$ .70	$1-\alpha=$ .80	$1-\alpha=$ .90	$1-\alpha=$ .95	$1-\alpha=$ .98	$1-\alpha=$ .99	$1-\alpha=$ .995
r_{10}	3	.684	.781	.886	.941	.976	.988	.994
	4	.471	.560	.679	.765	.846	.889	.926
	5	.373	.451	.557	.642	.729	.780	.821
	6	.318	.386	.482	.560	.644	.698	.740
	7	.261	.344	.434	.507	.586	.637	.680
r_{11}	8	.318	.385	.479	.554	.631	.683	.725
	9	.288	.352	.441	.512	.587	.635	.677
	10	.265	.325	.409	.477	.551	.597	.639
r_{21}	11	.391	.442	.517	.576	.638	.679	.713
	12	.370	.419	.490	.546	.605	.642	.675
	13	.351	.399	.467	.521	.578	.615	.649
r_{22}	14	.370	.421	.492	.546	.602	.641	.674
	15	.353	.402	.472	.525	.579	.616	.647
	16	.338	.386	.454	.507	.559	.595	.624
	17	.325	.373	.438	.490	.542	.577	.605
	18	.314	.361	.424	.475	.527	.561	.589
	19	.304	.350	.412	.462	.514	.547	.575
	20	.295	.340	.401	.450	.502	.535	.562
	21	.287	.331	.391	.440	.491	.524	.551
	22	.280	.323	.382	.430	.481	.514	.541
	23	.274	.316	.374	.421	.472	.505	.532
	24	.268	.310	.367	.413	.464	.497	.524
	25	.262	.304	.360	.406	.457	.489	.516

5. step: The suspicious measurement result x_1 resp. x_n is regarded as an outlier, if $r_{ij} > r_{1-\alpha}$.

For example: The series of measurement results is, already ordered:

$x_1 = 0.3850$

$x_2 = 0.3898$

$x_3 = 0.3928$

$x_4 = 0.3931$

$x_5 = 0.3935$ $n = 10$

$x_6 = 0.3949$ $\bar{x}_{(10)} = 0.3937$

$x_7 = 0.3958$

$x_8 = 0.3961$

$x_9 = 0.3962$

$x_{10} = 0.3998$

First of all the value x_1 seems suspicious.

Since $n = 10$, the expression $r_{11} = \dfrac{x_2 - x_1}{x_{n-1} - x_1}$

has to be calculated. It becomes

$$r_{11} = \frac{0.3898 - 0.3850}{0.3962 - 0.3850} = 0.429 .$$

If the probability of error is given by $\alpha = 0.1$ one has to compare this value of r_{11} with the value $r_{1-\alpha} = 0.409$ from the table given in step 4. In this example is $r_{11} > r_{1-\alpha}$ so that the value x_1 is regarded as an outlier.

The next suspicious value is x_{10}.

The calculation yields

$$r_{11} = \frac{x_{10} - x_9}{x_{10} - x_2 {}^{*)}} = \frac{0.3998 - 0.3962}{0.3989 - 0.3928 {}^{*)}} = 0.514 .$$

---

*) This value was named x_3 in the original series of results. After rejection of x_1 the series which is checked now begins with the value originally named x_2 .

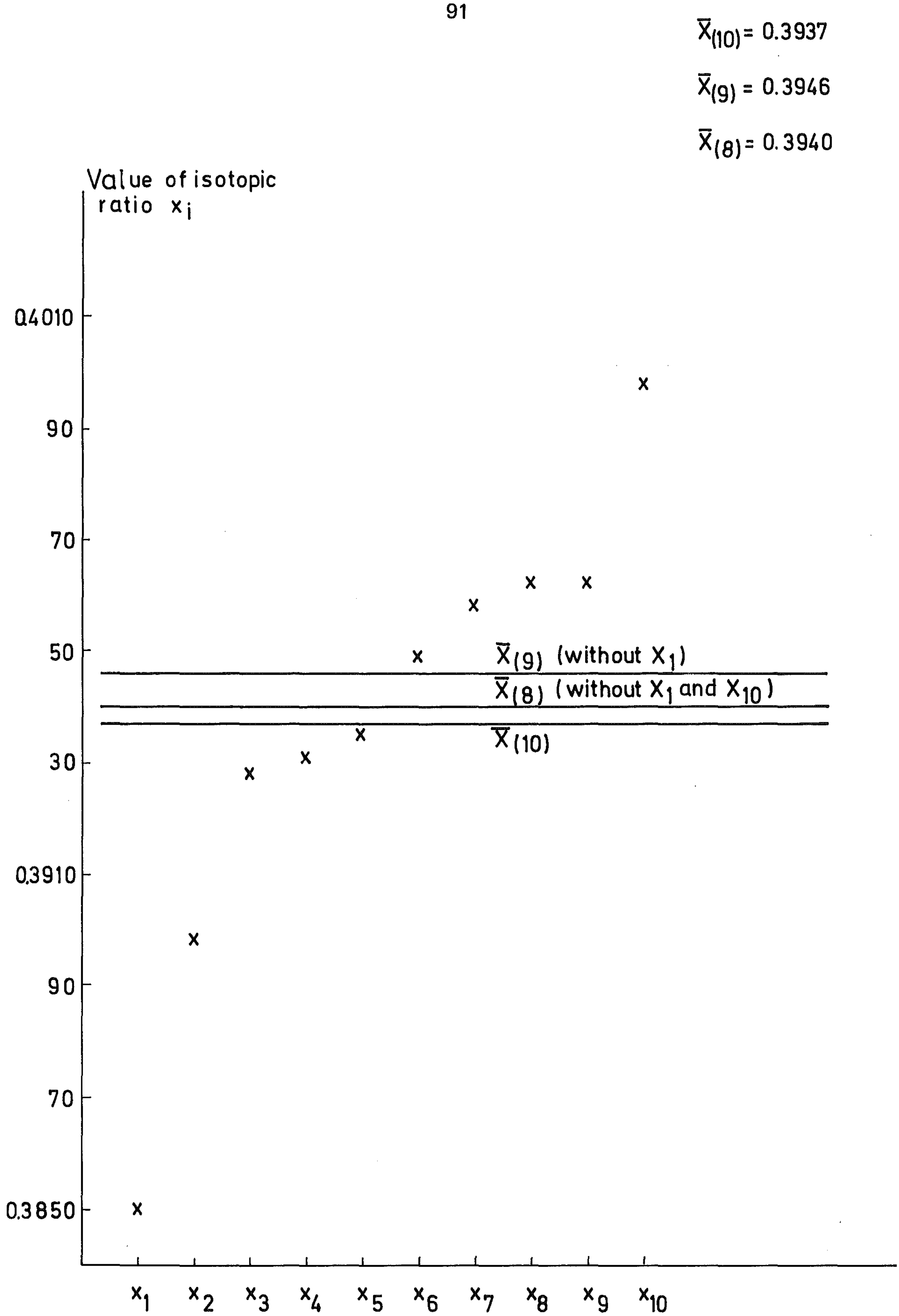

Fig.10-1: Example for the Application of the Dixon Criterion.

In the table $r_{1-\alpha} = 0.441$ is found for a series consisting of the residual 9 values. Since $r_{11} > r_{1-\alpha}$ also for this case, also the value x_{10} is regarded as an outlier.

From Fig 10-1 one could guess that also the value x_2 could be an outlier. The calculation leads to

$$r_{11} = \frac{x_3 - x_2}{x_8 - x_2} = \frac{0.3928 - 0.3898}{0.3961 - 0.3898} = 0.476$$

The corresponding $r_{1-\alpha}$ for 8 values is 0.479 so that in this case $r_{11} < r_{1-\alpha}$; i.e. x_2 is not regarded as an outlier.

10.3.2 Chauvenet - Criterion

In the following also the application of this criterion is described stepwise.

1. step : The algebraic mean of the n given measurement results **is calculated:**

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

2. step : The corresponding standard deviation **is calculated:**

$$s = \sqrt{\sum_{i=1}^{n} (\bar{x} - x_i)^2/(n-1)}$$

3. step : The measurement for which the expression $\left| \bar{x} - x_i \right|$ gives the highest value is named x^* and is looked upon as suspicious.

4. step : A value x_c has to be found which is determined by $\Phi (x_c) = 1 - \frac{1}{4\,n}$.

The function

$$\Phi (x) = \frac{1}{\sqrt{2\pi}} \cdot \int_{-\infty}^{x} e^{-\frac{t^2}{2}} dt$$

is found in several collections of mathematical tables, as e.g. in **Ref** /17/.

5. step : If $\left| \frac{x^{*} - \bar{x}}{s} \right| > x_c$,

the value x^{*} is considered as an outlier.

There exists another form of the rules given above. In this modification the suspected value x^{*} is not included in the calculation of algebraic mean and standard deviation according to steps 1 and 2. By doing so the difference between the suspicious value and the calculated "mean value" is growing greater and the standard deviation smaller so that the criterion becomes more sensitive (Chauvenet II).

Example:

As an example for the application of the Chauvenet criterion the same series of measuring results is taken, which was used as an example for the application of the Dixon criterion in Par. 10.3.2.

The values are - in original order

0.3949
0.3961
0.3935
0.3962
0.3998
0.3850
0.3958
0.3898
0.3931
0.3928

The calculation is done for both versions of the Chauvenet criterion given above.

	Chauvenet I	Chauvenet II
1. step	$\bar{x}_{(10)} = 0.3937$	$\bar{x}_{(9)} = 0.3946$
2. step	$s_{(10)} = 0.0040$	$s_{(9)} = 0.0030$
3. step	$x^* = 0.3850$ $\bar{x}_{(10)} - x^* = 0.0087$	$x^* = 0.3850$ $\bar{x}_{(9)} - x^* = 0.0096$
4. step	$\Phi(x_c) = 1 - \frac{1}{40} = 0.9750$ $x_c = 1.960$	$\Phi(x_c) = 1 - \frac{1}{36} = 0.9722$ $x_c = 1.914$
5. step	$\frac{0.0087}{0.0040} = 2.177 > 1.96$	$\frac{0.0096}{0.0030} = 3.20 > 1.914$

The suspicious value proves to be an outlier in both cases.

The same calculation is then carried out for the largest measurement value (in this calculation the outlier found before is excluded) :

Chauvenet I	Chauvenet II
$x^* = 0.3998$	$x^* = 0.3998$
$\bar{x}_{(9)} = 0.3946$	$\bar{x}_{(8)} = 0.3940$
$s_{(9)} = 0.0028$	$s_{(8)} = 0.0021$
$x_c = 1.914$	$x_c = 1.862$
$\frac{x^* - \bar{x}}{s} = 1.8571 < x_c$	$\frac{x^* - \bar{x}}{s} = 2.7619 > x_c$
The suspicions value is no outlier.	The suspicions value is an outlier.

From this example it becomes evident that the version "Chauvenet II" is the stricter criterion.

10.4 Numerical Results of the Comparison of the Dixon and Chauvenet Criteria.

To begin with, a computer program was written which allowed the application of the three possible criteria (Dixon, Chauvenet I and II). First the difference between the two versions of the Chauvenet criterion was tested. As a result of the application of these criteria to 120 series of measurements it came out that for the version I (suspicions value included in the calculation of mean value and standard deviation) one has the following result:

15.5 %	of the series show	1 outlier
8.1 %	"	2 outlier
2.4 %	"	3 or more outliers.

In contrast to this for the version II (suspicious value excluded from the calculation of mean value and standard deviation) one gets 3 or more outliers for more than 50 % of these same 120 series.

The empirical comparison of the effect of application of the Dixon criterion (with $\alpha = 0.1$) and the Chauvenet criterion (Version I) to the results of 5 laboratories for the standard experiment concerned 603 series of measurements and showed the following picture:

No. of series of measurements	Type of sample	No. of outliers Dixon (a)	No. of outliers Chauvenet I (b)	b/a
253	Unspiked sample solution	79	95	1.20
350	Spiked sample solution	68	125	1.84
Total: 603		147	220	1.50

At a first view this result is astonishing since one could have expected from a comparison of the probabilities of errors (Dixon : $\alpha = 0.1$; Chauvenet : $P = 0.050$ for $n=10$, $P = 0.056$ for $n=9$, and $P = 0.063$ for $n=8$) that the application of the Dixon criterion would yield more outliers than the application of the Chauvenet criterion.

The explanation could be that in the case of the Chauvenet criterion 10, 9 or 8 measurements have an influence, whereas in the case of the Dixon criterion only 3 measurements are taken into account for the single decision.

For all measurements of one laboratory the influence of the elimination of outliers according to both criteria on the mean values of each series was studied. The resulting shift in the mean values varies between 0.01 and 0.5 % in relation to the mean values of the uncorrected series of measurements. This large spread is easily explained by the fact that the influence on the mean value is small in cases where maximum and minimum are outliers. In all cases where one or two measurements at one end of the series are excluded, the influence of this elimination is relatively large. Apart from this it comes out that in approximately one third of the studied cases the mean values of the corrected series lie outside the region of the mean values of the two other parallel runs for this isotopic ratio and sample. This shows that without regarding the outliers one gets a wrong impression about the distribution of the run mean values.

Special Cases:

a) If the Chauvenet criterion is applied consecutively without the necessary precautions, it can result that too many values of one measurement series prove as outliers. This is shown in the following example:

The ordered sequence of measurements is:

2.274
2.282
2.289
2.296
2.300
2.300
2.301
2.302
2.305
2.307

1.) At the beginning the minimum value is suspicious. The application of the Chauvenet criterion (see above) yields:

$$x_1^* = 2.274$$

$$\bar{x}_{(10)} = 2.2956$$

$$s_{(10)} = 9.576 \cdot 10^{-3}$$

$$\frac{x_1^* - \bar{x}_{(10)}}{s_{(10)}} = 2.25 \qquad x_c = 1.96$$

Since 2.25 > 1.99, the value x_1^* is an outlier.

2.) A repetition of the application of the criterion gives:

$$x_2^* = 2.282$$

$$\bar{x}_{(9)} = 2.2980$$

$$s_{(9)} = 6.697 \cdot 10^{-3}$$

$$\frac{x_2^* - \bar{x}_{(9)}}{s_{(9)}} = 2.39 \qquad x_c = 1.914$$

Again 2.39 > 1.914 so that x_2^* is also an outlier.

3.) Now x_3^* is looked upon as suspicious.

$$x_3^* = 2.289$$

$$\bar{x}_{(8)} = 2.300$$

$$s_{(8)} = 4.984 \cdot 10^{-3}$$

$$\frac{x_3^* - \bar{x}_{(8)}}{s_{(8)}} = 2.20 \qquad x_c = 1.86$$

Also this value is an outlier.

4.) Another application leads to:

$x_4^* = 2.3070$

$\bar{x}_{(7)} = 2.3015$

$s_{(7)} = 4.660 \cdot 10^{-3}$

$\frac{x_4^* - \bar{x}_{(7)}}{s_{(7)}} = 1.17 \qquad x_c = 1.79$

Finally this measurement proves to be no outlier.

In this case ~ 30% of the measurements are eliminated. It seems justified to check if the premises for the application of the criterion were given, i.e. if the values were normally distributed. For this test statistical procedures are known/Ref. 11/. In our example we can follow from the measuring procedure in the mass spectrometer that a normal distribution cannot be assumed since there is a high probability of systematic errors (e.g. the ion beam intensity of the instrument depends on the temperature of the filament, which is not constant in course of time).

b) In parallel also the application of the Dixon criterion may lead to problematic results, as the following example shows.

For the very low isotopic ratios one gets results in the order of 10^{-6}. A real series of measurements then looks like

0.000001
0.000001
0.000002
0.000002
0.000002
0.000001
0.000001
0.000001
0.000003
0.000002

because of the limited sensitivity of the measuring system, i.e. there is only one significant digit. When the Dixon criterion is applied to such a series the value 0.000003 is excluded as an outlier even if the probability of error is put $\alpha = 0.05$.

10.5 Resulting Considerations for the Application of Outlier Criteria to the Data of the IDA - 72 Experiment.

The application of an objective criterion which can be used in a computer program with the aim to eliminate strongly deviating (wrong) measurements and to find errors of typing and data transmission seemed inevitable. The alternatives taken into consideration were

- Dixon criterion
- Chauvenet criterion, version I
- " " , version II .

The version II of the Chauvenet was excluded because it yields too many outliers - see above. Also the normal version I of the Chauvenet criterion gives 1.5 times more outliers than the Dixon criterion and so did not fulfill the condition of rejecting strongly deviating values only. In addition to this the premise that the measurements should be normally distributed is more important for the Chauvenet criterion than for the Dixon criterion, because in the calculation of the distribution function $F_{r_{ij}}$ of the quotients of differences r_{ij} the expectation value μ and the variance σ^2 of the measurements x_i are not used in contrast to the calculations necessary for the application of the Chauvenet criterion. Since this condition of a normal distribution cannot be fulfilled strictly by the real measurements we came to the conclusion that the Dixon criterion is the more appropriate one.

In the case of the Dixon criterion it is easy to change the sensitivity of the criterion by adjusting the probability of error.

In our study for the standard experiment results from four laboratories the numbers of outliers found under the assumption of a certain α were plotted against these α-values. Fig. 10-2 shows that in three of four cases the curves indicate a region where the number of outliers is independent of α. This region (A) lies between $\alpha = 0.0$ and $\alpha = 0.02$; above $\alpha = 0.02$ (region B) the relation between α and the number of outliers seems to be linear. For the application of the criterion with an α-value from region A it is plausible that false measurements are excluded by this choice as it was defined as our aim in the application of an outlier criterion. So the value $\alpha = 0.01$ was chosen in order to be sure not to be in region B where the variance of the measurements could be affected by omission of too many outliers (see above). Our decision should be looked upon as practically oriented for the actual experiment - it cannot be a general judgement on the criteria or a basis of procedures for other experiments.

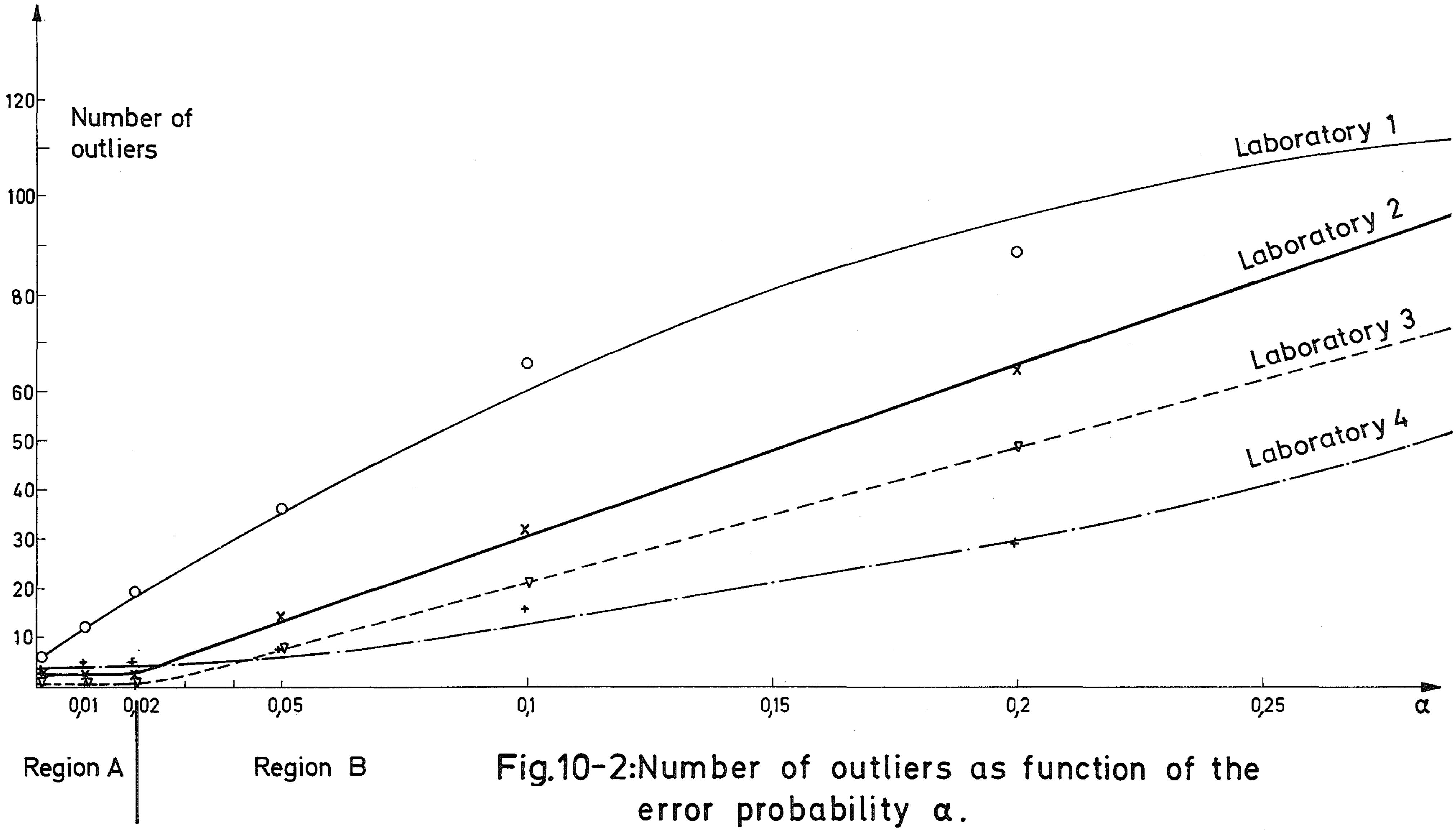

Fig.10-2: Number of outliers as function of the error probability α.

11. Comments to the Computer Program for the Evaluation of the Standard Experiment and Some Additional Experiments in the Framework of IDA-72

by

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Table of Contents

11.1 Introduction

This report is written in order to allow a better understanding of the computer program and the results printed out for each participating laboratory. An example for the output list is given in Chapter 12.

11.2 Organisation of the Computer Program for the Evaluation of the Standard Experiment

The program is written in FORTRAN IV for an IBM 370/185 computer. It is organized in the form of one main program and a number of subroutines for special calculations. A typical run with the data from about 20 laboratories (40 000 numbers) takes about 1 minute, and about 480 000 locations of storages are needed.

In the following a list of the parts of the program system is given with very short indications on what is done in these parts.

MAIN	reading of data cards and general program organisation
HANNA	block data subroutine, necessary for data organisation
DIXON	application of outlier criteria
MINL	ordering of a series of input data (in double precision), necessary for DIXON
COR	application of special corrections for the data from one laboratory
LAB1	calculation of the mean value of eight scan values with variance, standard deviation and relative standard deviation
LAB2	calculation of the mean value of three runs with "double stage" variance analysis
ALPHA	reading of α-measurement results, calculation of their mean values
LAB3	calculation of the isotopic composition of the different samples, inclusion of α-measurements

LAB4 calculation of U- and Pu-concentrations

LAB5 "triple stage" variance analysis: scan, run and interlaboratory error components

LAB6 "double stage" variance analysis: run and interlaboratory error components

11.2.1 General Information and Comments on the Single Parts of the Program

In some of the tables comprising results of the computer calculations, abbreviations for sample types and isotopic ratios have been used. Since these refer to more than one subroutine of the program, they are listed and explained here.

With respect to the isotopic ratios the abbreviations stand for the following ratios:

83	U-238/ U-233
92	Pu-239/ Pu-242
2	Pu-240/ Pu-242
38	U-233/ U-238
48	U-234/ U-238
58	U-235/ U-238
68	U-236/ U-238
89	Pu-238/ Pu-239
9	Pu-240/ Pu-239
19	Pu-241/ Pu-239
29	Pu-242/ Pu-239

The type of the samples is indicated by letter combinations which mean:

US	uranium spike solution
PS	plutonium spike solution
AU	unspiked A sample solution
BU	unspiked B sample solution
RU	unspiked R sample solution
AS	spiked A sample solution
BS	spiked B sample solution
RS	spiked R sample solution

In the following the single parts of the program, which is listed in Par.11.4, are described in an order which follows the order of the calculations.

At the same time the produced output is explained so that this paper can serve as a guide for reading the results of

a) the single laboratories
b) the group of all laboratories.

Typical output lists are given in Chapter 12.

In some of the program lists comments are given, marked by the letter "C" in the first column of the respective line, in order to explain the procedure. In addition some statements which were necessary for testing purposes have been made "dummy" by putting a "C" in column 1 of the punch cards.

11.2.2 MAIN Program

The calculations for the IDA-72 standard experiment begin with the main program MAIN. In this part of the program, which is central for all calculations, mainly all data are read in, and the other subroutines of the program, which are written for special calculations, are called.

In particular:

a) at the beginning of MAIN the data for the correction for the AM-241 decay of Pu-241 are read in (statement 0041 etc. - the internal statement numbers are given at the beginning of the lines in the program listing).

The time intervals between sample preparation and Am separation which have to be known for this correction can be found in this program. They are given in days. The code numbers of the respective laboratories are given as M = ... (e.g. M = 2 in statement 0042).

The three indices of the variable DEC are this code number, a number indicating the type of sample (3 corresponds to AU, 4 to BU and 5 to RU, 6 to AS, 7 to BS and 8 to RS), and the last index gives the number of the run (cf. e.g. statement 0043 from which one can see that the decay time of the sample material AS for the first run in laboratory 2 was 106 days). The two indices of DC are the laboratory code number and the number indicating the type of sample - in these simpler cases the chemical treatment for all runs of the same sample was performed at the same day.

b) A typical example of a data sheet as they were sent to the evaluation group by the laboratory is given in Fig. 11-1. Fig. 11-2 shows how the same data for the ratios Pu-238/Pu-239 and Pu-240/Pu-239 have been put on punched cards for the computer input (the columns 73-80 of these cards are meaningless in this context). The information that no mass spectrometric measurement of the ratio Pu-238/Pu-239 was performed is transmitted by punching the 9.9 in columns 12 to 13 of the first card.

At the beginning of the data of each lab the sentence

NEW SERIES OF MEASURING RESULTS

is printed on top of a new page.

c) For some laboratories (code no. 15 and 18) this part of the program differs from the normal procedure. For laboratory 18 the mass discrimination and other correction factors were given separately and are applied by means of the computer program. For doing so, an extra subroutine COR was written, see 11.2.6.

For laboratory 15 the data cards were punched in a different format.

d) In the next part of the program each series of - normally 10 - measurements for one specific isotopic ratio of one specific sample is checked for the actual number of measurements.

Interesting are e.g. the following possibilities:

α) no measurements at all

β) only one measurement

γ) $\leq$ 8 measurements

δ) 10 measurements.

<u>Standard Experiment</u>

Sample: A (spiked) - Plutonium   Code: 15 *

(For α-spectrometric data, see II-39)

Chemical preparation No.: 2   Date: 9.8.1972

Date of MS-measurement: 14.8.1972

Scan No.:	Atomic Ratio			
	238/239	24o/239	241/239	242/239
1	0.----	0.2332	0.1261	1.288
2	-	0.2339	0.1259	1.293
3	-	0.2339	0.1270	1.301
4	-	0.2357	0.1267	1.301
5	-	0.2334	0.1258	1.283
6	-	0.2335	0.1262	1.297
7	-	0.2327	0.1267	1.300
8	-	0.2340	0.1274	1.300
9	-	0.2347	0.1255	1.297
10	-	0.2354	0.1257	1.295

Don't use this space!

Remark:

Fig. 11-1 Example for a Data Form Sheet

* The data are published with the kind permission of the laboratory

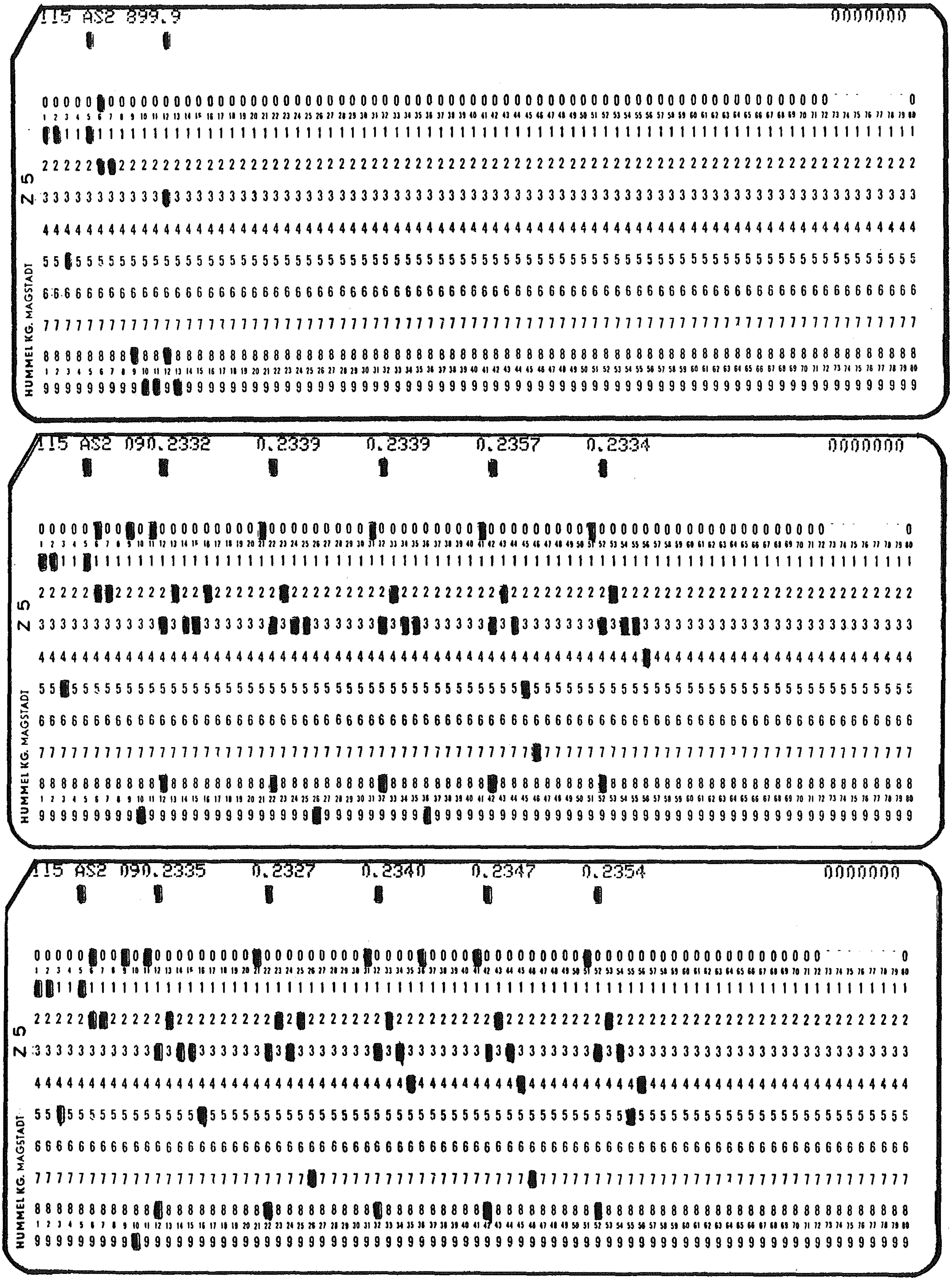

Fig. 11-2 Examples of Data Cards

After this a line is printed giving the code number of the lab, the type of the sample, the number of the run, and the measured ratio, e.g. :

3 BS2 48

e) If there are more than 8 input values, their number is reduced to 8 by applying the Dixon outlier criterion or by omitting the last input values if no outliers can be found.

The subroutine DIXON, which is called in the statement with the internal No. 0291, and its output is shortly described under 11.2.5, the underlying mathematical procedure is dealt with in Chapter 10.

f) After this selection of input values the "Am-241 corrections" are applied to the input values of the measured Pu-241/Pu-239 ratios. (internal statements 0295 - 0352).

g) After that the run mean values of the series of measurements are calculated in subroutine LAB1, see 11.2.7. The results of this subroutine are passed back to the main program and then a table is printed as described under 11.2.7.

h) In the following (internal statements 0358 etc.) the subroutines LAB2, LAB3 and LAB4 which are concerned with the results of the single laboratories are called. The calculations for the group of laboratories are done in the subroutines LAB5 and LAB6.

i) In addition a combined table of laboratory mean values for isotopic ratios (results of LAB2) is printed in the main program.

j) Parts of the additional experiments in the framework of IDA-72 are also connected with the standard experiment via the main program.

11.2.3 BLOCK DATA

In the program listing the MAIN is followed by a BLOCK DATA subroutine. This part of the program is necessary for data organisation in the computer.

It produces no output.

11.2.4 Subroutine DIXON

In this subroutine each series of measuring results consisting of more than 8 values is checked for outliers. The criterion of DIXON /Chapter 10/ is adjusted in such a way that only rather large deviations of single measurements are "discovered" - so the application of the test has more or less the function of discovering errors in data transmission.
The output of this subroutine is sent to the single laboratories. For each series of measurements the values are put into ascending order by the subroutine MINL /11.2.5/. The resulting series is printed. If an outlier at the lower or upper end of this ordered series of data is found, a comment is printed, saying e.g. ;

THE MAXIMUM VALUE S(10) = 0.000300 IS CANCELLED

The check for an outlier value at the end of this ordered series is repeated. If an outlier is found in a series of 8 remaining values an extra comment is printed:

********** THE 8TH INPUT VALUE IS AN OUTLIER *******,

but this outlier value is kept as a member of the series of measuring results.
If the series of measuring results consists of more than 8 values after the check for outliers the first 8 of the original input list modified by omission of the eventual outliers are taken as output values for this subroutine.

For cases with outliers the 8 resulting values after rejecting the outliers are listed in original order under omission of the outliers, the number of outliers is mentioned in an extra line.
The results are passed to the main program.

11.2.5 Subroutine MINL

This subroutine was written to put double precision numbers into ascending order.
It is called from subroutine DIXON, passes the results to DIXON, and produces no output.

11.2.6 Subroutine COR

This subroutine was written to apply mass discrimination and some other corrections to the data from the laboratory with code no. 18.

The subroutine is called after the application of the Dixon outlier criterion. After multiplication with the necessary correction factors (internal statement no. 0064 etc.) the same calculations as in the program MAIN are done for the data of this laboratory up to calling the subroutine LAB1.
The results of COR and LAB1 are returned to MAIN.

11.2.7 Subroutine LAB1

The results of this subroutine are printed in a table with 9 columns. In the first column the abbreviations for the isotopic ratios are given. In the second column the type of the sample is indicated. The run numbers in the third column are self-explaining.

The fourth column gives the run mean value of the ratio and sample indicated in the respective line. The formula for this mean is

$$\overline{X}_{jk} = \frac{1}{8} \sum_{i=1}^{8} X_{ijk}$$

X_{ijk} are the single scan results (the data sent to us on the distributed forms, an example is given above as Fig. 11-1) after application of the Dixon-criterion.

The indices stand for

- i - number of the scan
- j - number of the run
- k - number of the laboratory.

The expression 0.38950000 D-02 e.g. stands for $0.3895 \cdot 10^{-2}$. The letter D indicates that the calculations are done in double precision, that means with about 16 decimal digits.

After the calculation of the mean value, the scan variance σ^2_{jk}, the corresponding standard deviation SD_{jk} and relative standard deviation RSD_{jk} (in %) given in columns 5, 6, 7 are calculated.

The formulae are:

$$\sigma^2_{jk} = \frac{1}{7} \sum_{i=1}^{8} (\overline{X}_{jk} - X_{ijk})^2$$

$$SD_{jk} = \sqrt{\sigma^2_{jk}}$$

$$RSD_{jk} = (SD/\ \overline{X}_{jk}) \cdot 100$$

Column 8 gives the number of scans which was supplied by the laboratory for the run; in cases where this number is $\leq$ 8, no outlier criteria are applied and the calculations described above are adjusted for the smaller number. In special, if this number is 0, one will find 0.0 in columns 4-7 in order to indicate that there were no measurements available. Sometimes a variance value in the order of $\sigma^2_{jk} = 0.1 \cdot 10^{-40}$ is found in column 5. This is the result of the computer calculation for cases where all values in a series of measurements are equal. This result should be read as 0.0, the calculation of the standard deviation and relative standard deviation is meaningless in these cases.

Finally, column 9 gives the number of outliers found for each run. The total number of outliers is given in the title of the table.

11.2.8 Subroutine LAB2

The subroutine LAB2 calculates for each laboratory the mean value (MEANA), variance (SG2), standard deviation (SDG), and relative standard deviation (RSDG) for all measured isotopic ratios of the distributed samples. In addition it gives run and scan components of variances, standard deviations and relative standard deviations.

The results of this subroutine are printed in a table for each laboratory.
This table gives the abbreviation for the measured isotopic ratio in the first column, the name of the sample under consideration (see 11.2.1) in the second column.

The third column gives the laboratory mean value which is calculated from the results of subroutine LAB1 as:

$$\bar{\bar{X}}_k = \frac{1}{3} \sum_{j=1}^{3} \bar{X}_{jk}$$

(Again this formula is given for the "normal" case with 8 scans and 3 runs, for other cases the formula was adjusted.)

The variance for the laboratory mean value, given in column 4, is calculated as

$$\sigma_k^2 = \frac{1}{6} \sum_{j=1}^{3} (\bar{\bar{X}}_k - \bar{X}_{jk})^2$$

the standard deviation (column 5) and relative standard deviation (column 6, in %) are

$$SD_k = \sqrt{\sigma_k^2}$$

$$RSD_k = (SD_k / \bar{\bar{X}}_k) \cdot 100 .$$

The formulae for the estimates of the run and scan components (column 7 - 12) are given in the report on the Mol III-experiment / 18/.

In addition to these tables there also exists a table where the results of the subroutine LAB2 for all labs are combined so that one can easily make a comparison.

11.2.9 Subroutine ALPHA

In this subroutine first of all a test number indicating whether the laboratory under consideration has performed α-measurements (test number = + 7.) or not (test number = + 8.) is read in.
If α-results are available, the normal input data of the laboratory are followed by 6 extra punch cards containing the information about three repeated measurements of the activity ratios Pu-238/(Pu-239 + Pu-240) of the six samples AU, BU, RU, AS, BS, and RS.

The results of this subroutine are printed in a little table.
This gives for each laboratory, which has performedn α-measurements, and for each sample the mean value of the measured α-activity (column 2), the variance, standard deviation and relative standard deviation of the single measurements (column 3-5), the relative standard deviation of the mean value (column 6) and the calculated ratio Pu-238/Pu-239.

The RSD of the mean value (in %) is calculated as

$$\text{RSD (mean)} = \frac{100}{\overline{X}} \sqrt{\frac{\sum_{i=1}^{n} (X_i - \overline{X})^2}{n(n-1)}}$$

where $\overline{X} = \frac{1}{n} \sum_{i=1}^{n} X_i$

whereas the RSD of the single measurements (in %) is defined as

$$\text{RSD (single measurement)} = \frac{100}{\overline{X}} \sqrt{\frac{\sum_{i=1}^{n} (X_i - \overline{X})^2}{n-1}}$$

11.2.10 Subroutine LAB3

This subroutine calculates the isotopic composition of the samples in atom percentages and weight percentages for each sample and each laboratory. The results of alpha spectrometry are included if the ratio Pu-238/Pu-239 has been determined by this method.

In order to give an indication of how the values are calculated, an example is given here. The content of U-235 (in atom percents) for sample AU is e.g. calculated as

$$\text{ATU 235} = \frac{X_k(\text{AU58}) \cdot 100}{(X_k(\text{AU38}) + X_k(\text{AU48}) + X_k(\text{AU58}) + X_k(\text{AU68}) + 1)}$$

In this formula X_k(AU58) stands for the mean value of the ratio (U-235/Pu-238) for the unspiked A-sample (AU) which the laboratory k obtained. For the other isotopic ratios of U and Pu the same nomenclature is used and the formula is applied correspondingly.

For the case of the inclusion of α-measurements the ratio Pu-238/Pu-239 comes from the subroutine ALPHA /see 11.2.9/, all other ratios are the results of mass spectrometry which have been used before.

For the calculation of weight percentages each isotopic ratio in the "prototype" formula above has to be replaced by its atomic percentage multiplied by the atomic weight of the corresponding isotope.

The atomic weights given in Chapter 1 have been used (one can find them in the program in the statements with internal no. 0068-0072 for U and in the statements 0084-0088 for Pu). Also here an extra calculation is made, if results of α-spectrometry are available.

The tables printed in this subroutine should be self-explaining. The same abbreviations as above are used, cf. 11.2.1.

11.2.11 Subroutine LAB4

Also this subroutine calculates results for single laboratories. It has been written in order to get four different types of results:

a) U-concentrations

b) Pu-concentrations calculated on the basis of mass spectrometry data only

c) Pu-concentrations calculated using α-spectrometry data for Pu-238

d) U/Pu ratios

In the output tables one finds for uranium and plutonium first the concentrations of the reference isotope (U-238 or Pu-239, respectively) in atoms/g solution and then the element concentrations (in mg U/g solution or μg Pu/g solution, respectively).

The Pu-results are sometimes given in two versions, see b) and c) above.

In all these blocks the results are given in the following order:

results of the 1st run	:	line 1
" " " 2nd "	:	" 2
" " " 3rd "	:	" 3
mean values of the results above	:	" 4

These results are given for the samples A, B and R.

In addition, in columns 4 and 5 so-called "calibrated" values for samples A and B can be found. As has been pointed out in the evaluation paper /Vol.I, Par. 3.5.1/ seems meaningful to calibrate the results on the A and B samples by multiplying them by the ratio RC

$$RC = \frac{\text{concentration of R-sample stated by the CBNM}}{\text{concentration of R-sample measured by the laboratory}}$$

The calculations for the concentration values are done as follows: First the concentrations of the reference isotopes (U-238, Pu-239) on the basis of the single runs are calculated.
For this the following formula is applied:

$$C = \frac{1 - RR_s}{R-R_u} \cdot \frac{G_s}{G_u} \cdot S$$

with (the uranium case is given for example):

R = Ratio U-233/U-238 of the spiked sample, corresponding run mean value from subroutine LAB1.

R_u = Ratio U-233/U-238 of the unspiked sample, laboratory mean value from subroutine LAB2.

R_s = Ratio U-238/U-233 of the mixed spike solution, laboratory mean value from subroutine LAB2 *)

G_s and G_u = Masses of the aliquots of spike and unspiked solution, as follows /cf. also Par. 3.2.3 to 3.2.5/

Sample	G_s [g]	G_u [g]
A	47.114	52.154
B	47.157	55.377
R	46.628	45.943

S = Number of atoms U-233 per gram of mixed spike solution

= $2.0931 \cdot 10^{18}$, calculated from the data given in Par. 3.2.2.

From these three "run concentrations" the laboratory mean value given in the next line of the output and its variance, $\sigma^2 = \frac{1}{6} \sum_{j=1}^{3} (C_{jk} - \bar{C}_k)^2$ standard deviation and relative standard deviation are calculated.

*) In the case of Pu a fixed value 0.0134 as measured by the CBNM was used for all calculations for all the laboratories /Par. 3.2.2 and Vol. I, Par. 3.5.1/.

For getting the element concentrations these numbers are multiplied by a "weight factor" which is (for uranium as example, again):

W = 233.0395 · lab mean value of the ratio U-233/U-238 in the unspiked sample

+ 234.0409 · ...." U-234/U-238 ...."

+ 235.0439 · ...." U-235/U-238 ...."

+ 236.0457 · ...." U-236/U-238 ...."

+ 238.0508

For plutonium the corresponding values have to be inserted.
For the nuclide masses used cf. Par. 1.1.
In the 5th line of the block concerning the concentrations of the reference isotopes, the relative standard deviations of the mean value for samples A, B and R are given. For the element concentrations in addition two lines, giving the variance and standard deviation, are inserted. This information is given for the samples A, B and R.

If any laboratory has not measured the Pu-238/Pu-239 ratio by mass-spectrometry, a note is printed before the Pu-concentrations are given. These concentrations are then calculated as if the Pu-238 concentration were = 0. for this sample.

If α-measurements exist, an extra block of results, giving the Pu-concentrations calculated after inclusion of these measurements, is printed. It has the same appearance as the block for the Pu concentrations based on mass-spectrometer measurements only.

After the end of the results of this subroutine the Pu/U-element-ratios for the three samples A, B and R are printed. They are calculated from the "calibrated" values for the A and B samples. The first line gives the results of mass-spectrometer measurements, in the second line α-measurements are included, if they have been performed.

11.2.12 Subroutine LAB5

This subroutine uses the results of all laboratories in order to determine the estimates of scan, run, and interlaboratory error components for the measurements of the isotopic ratios for the different samples.

Since the results of this subroutine belong to the group b) defined in Chapter 11.2.1 the output table was not distributed to the laboratories. It is now included in Chapter 12.3. For each sample and ratio this output table gives the number of laboratories, runs and scans taken into account for the calculations. In some cases results of particular laboratories have been omitted for reasons given in Vol.I,Par.3.2.3 (too large deviations e.g.). In the following columns of the table the calculated overall mean values, followed by variance, standard deviation and relative standard deviation for scan-, run- and interlaboratory-components are printed.

This table gives one aspect of the results of the whole experiment in a very compressed form on one page.

The formulae used for the calculation can be found in the report of the Mol III-experiment /19/.

11.2.13 Subroutine LAB6

This subroutine was written in parallel to subroutine LAB5. It gives an analysis of variances in two stages, that means beginning with the run mean values. It seemed useful to check the rather complicated calculations of LAB5 by this simpler analysis, made under the assumption that in general the scan components of the overall error can be neglected. Also this subroutine belongs to group b) - results of the group of laboratories. An example of output is included in Chapter 12.3.The meaning of the numbers in the single columns is (from left to right):

Code for the isotopic ratio (see Par. 11.2.1), code for the sample (see Par. 11.2.1), mean of laboratory mean values for the isotopic ratio, variance of this mean, corresponding standard deviation, corresponding relative standard deviation; interlaboratory component of the variance, corresponding standard deviation, corresponding relative standard deviation; run component of the variance, corresponding standard deviation and relative standard deviation.

This subroutine corresponds to the subroutine LAB2 in which the calculations for a twofold analysis of variances are performed for the measurements inside one laboratory.

11.3 Programs for the Evaluation of Some Additional Experiments.

11.3.1 General

Since the group of the additional experiments: self spike experiment, dry spike experiment, aluminium-capsule experiments, aging experiments and X-ray fluorescence comprises rather different parts it was not so evident that also these experiments should be evaluated by means of a computer program.
We came to the following conclusion:
For experiments with a larger group of participants (self spike, dry spike and aluminium-capsule) all the series of measurement results were checked for outliers by application of the DIXON subroutine.
For the self spike experiment the following calculations were done without a computer program /cf. Volume I, Chapter 4), because a lot of information was laboratory-dependent.
The remaining calculations for the dry spike and aluminium-capsule experiments were done in a subroutine DRY (see below). The rest of the other additional experiments were evaluated in collaboration of the laboratories performing these experiments and the evaluation group /Volume I, Chapter 8; this Volume, Chapter 9/.

11.3.2 Subroutine DRY

For the dry spike and aluminium-capsule experiments described in Vol. I, Chapter 5 the data and results coming from the standard experiment and these additional experiments had to be combined. This was done in the subroutine DRY.

This subroutine is called from the MAIN program used for the evaluation of the standard experiment (internal statement no. 432 etc.). The data needed as input of the subroutine DRY are put in on data cards following the block of all data cards for all laboratories participating in the standard experiment. They are read in by the subroutine DRY. Some information necessary for corrections is given in the MAIN program.

A list of the subroutine DRY is given in Chapter 11.4.

This subroutine produces output which follows the block of output of the standard experiment.
An example is included in Chapter 12.2.

In the first line of this output the code number of the laboratory is given. In the next block the input values are listed. Each line corresponds to one run consisting of 10 scans for one sample and isotopic measurement. In each line the three last numbers give the aliquot weights of spike and sample and the number of the respective spiked sample. The order is: Three series (runs) of isotopic ratios U-235/U-238 for the first sample /cf. Volume I, Chapter 1.2 and 5/, three series of isotopic ratios U-235/U-238 for the second sample, three series of isotopic ratio Pu-242/Pu-239 for the first sample, and three series of isotopic ratios Pu-242/Pu-239 for the second sample.
Although also in this subroutine the subroutine DIXON (see Par. 11.2.4) is called the output normally produced by DIXON has been suppressed in this case. The next block gives the run mean values together with variances, standard deviations and relative standard deviations in the order indicated in the output list. The uranium and plutonium concentrations (given as number of atoms/g solution) which the laboratory got for the three runs of the standard experiment are printed in the next block. This allows a comparison with the results of the additional experiment which are given in the following block.

After this the mean numbers of atoms for uranium and plutonium in sample A-1 and A-2 are given, calculated firstly on the basis of the measured isotopic ratios and secondly on the resulting numbers of atoms. Due to different steps in the calculation these number can differ slightly. Unlike to the standard experiment, these values are different for each laboratory and sample.

The formulae used for the calculations in this subroutine are the same which are used for the calculations of those concentrations which are determined in the standard experiment. These formulae are given in Par. 11.2.11 above:

$$C = \frac{1 - RR_s}{R - R_u} \cdot \frac{G_s}{G_u} \cdot S$$

The weights of the aliquots of the spike solution (G_s) and of the unspiked sample solution (G_u) are included in the input data for this subroutine, see above. S is the number of atoms of the spike isotope (U-233 and Pu-242, respectively) per gram of the spike solution; for R_s, the ratio main isotope / spike isotope in the mixed spike solution (U-233 /U-238 and Pu-242/Pu-239 respectively), and for R_u, the ratio spike isotope/main isotope in the unspiked sample solution (U-233/U-238 and Pu-242/Pu-239,respectively) the laboratory mean values from the standard experiment are used.

R is the isotopic ratio spike isotope/main isotope (U-233/U-238 and Pu-242/Pu-239, respectively) measured as run mean value in the dry spike experiment.

This same subroutine DRY has been used for the evaluation of the first part of the aluminium-capsule experiment. Also the output has the same appearance, in this case one should read "aluminium -capsule experiment" instead of "dry spike experiment".

11.4 Computer Program

Corrigenda

Due to a change in computer operation some lines of comments given in this program were truncated. The complete lines are given here for these cases; in addition some errors in the comments are indicated.

Page	Statement No. before comment	Complete text of comment
144	0052	Evaluation of extrema and decision, where an outlier is more probable
	0057	This parameter is a hint to the left part of the flow sheet; an outlier ....
156	0001	The input values for this subroutine are ratios of alpha-activities
158	0001	Input values are the mean values over scans and runs = lab mean values .... MEAN (M3, K3, LL3), where .... J3 ... should be skipped
159	0042	In this vector the order of isotopes is: 7-239, 8-238, 9-240, 10-241, 11-242
160	0055	Calculation of atom percentages with inclusion of alpha-measurements
162	0001	This subroutine calculates the U and Pu concentrations and U/Pu ratios for ....
163	0027	K4 indicates the sample type; order of sample types: US, PS, AU, BU, RU, AS, BS, RS .... Isotopic ratios are given in the order 83, 92, 02, 38, 48, 58, 68, 89, 09, 19, 29
164	0045	The values KO define the concentration of the reference isotope, e.g. U-238,
	0060	In the formulae for C the results MEANV from LAB1 and MAIN are used
	0064	In the vectors C and CON the indices K4 = 3,4,5 stand for the original ...
165	0085	Lab. 22 has not measured the Pu spike, the BCMN value is taken.
166	0102	Special cases of missing measurements of ratio 242/239 and missing runs
171	0026	MM(K,LL) is the number of labs, for which standard experiment results are ... . SS(K,LL) is the number of runs in all labs, in which the isotopic ratio ...
	0035	For the US sample only one isotopic ratio and for the PS sample only two ....

```
FORTRAN IV G1  RELEASE 2.0          MAIN             CATE = 74346          17/52/56
                 C
                 C
                 C
                 C
                 C
                 C
 0001                 REAL TYP(8)/'US  ','PS  ','AU  ','BU  ','RU  ','AS  ','BS  ','RS
                     1'/
 0002                 REAL*8 SIGMA,SIGMAV(  8,3,11)/ 264*-3./,SQI,SQIV(  8,3,11)/ 264*-3
                     1./,MEAN,SDV(8,3,11)/264*-3./,RSDV(8,3,11)/264*-3.
                     2             / ,X(10),S(10),Y(10),Z(10),ZZ(10),A(8),F(3),
                     3          WALPHA(21,8)/168*0./ ,SUMV(21,8,3,11),SD,RSD,SUMM
 0003                 REAL *8 MEANV (21,8,3,11)/5544*-3./,MEAN2(21,8,11)/1848*0./
 0004                 INTEGER IR(11) /83,92,02,38,48,58,68,89,09,19,29/,IRE(21)/21*0/
 0005                 INTEGER * 2
                     1MVAL(  8,3,11)/ 264*8/,SUMOUT(21) ,NAUS(  8,3,11),LVAL(8,3,11)
 0006                 DIMENSION IEXP(21),ILAB(21),SAMP(21),IRUN(21), IREL(21),ITYPE(21)
 0007                 INTEGER * 2   IFILIV(21,8,11)/1848*0/,MVALV(21,8,3,11)
 0008                 COMMON /HANNA/ LINKS,MX,NVAL
                     1/ITEMS/SG2V(21,8,11),SDGV(21,8,11),RSDGV(21,8,11),RSDCOV(21,8,11),
                     1SIGA2V(21,8,11),SDAV(21,8,11),RSDAV(21,8,11),SIGE2V(21,8,11),SDEV
                     2(21,8,11),RSDEV(21,8,11),DIFV(21,8,11)
                     3/DRYA/ KO(21,3,5,2),KOAL(21,3,5,2)
 0009                 REAL*8 KO,KOAL,MDC,FACT
 0010                 REAL*8 SG2V,SDGV,RSDGV,RSDCOV,SIGA2V,SDAV,RSDAV,SIGE2V,SDEV,RSDEV,
                     1DIFV,DEC(22,8,3)/528*1./,DC(22,8),DICO(2)
                 C
 0011             1000 FORMAT (I2)
 0012             1001 FORMAT (I1,I2,1X,A2,I1,1X,I2,5F10.6)
 0013             1002 FORMAT (/I3,2X,A2,I1,1X,I2)
 0014             1003 FORMAT (F11.8)
 0015             1004 FORMAT (/'1NEW SERIES OF MEASURING RESULTS'/)
 0016             1005 FORMAT (' TYP(I=1...8)=',8(A2,2X),',SAMP(M) AND ITYPE(M)=',A2,I3)
 0017             1006 FORMAT('1',///9X,' STANDARD EXPERIMENT - RESULTS OF PROGRAM LAB1
                     1',/ ,  9X,' MEAN VALUE,VARIANCE,SC ANC RSD FOR THE ISOTOPIC RATIOS
                     2 OF EACH RUN',/, 9X,' (8 SCANS/RUN WERE CONSIDERED)',/,'OLABRATORY
                     3 CODE NO:',I5,  5X,' TOTAL NUMBER OF OUTLIERS FOR THIS LAB=',I5,/
                     4 ,30X,'THE PU-241 VALUES OF THE UNSPIKED SAMPLES HAVE BEEN CORRECT
                     5ED FOR AM-241 DECAY'//'OISCT.RATIO    SAMPLE   RUN   RUN-MEAN
                     6SCAN-VARIANCE    SCAN-SD',9X,'SCAN-RSD(%)      NO.OF MEASUREMENTS  NO
                     7.OF OUTLIERS')
 0018             1007 FORMAT (' THE VALUE X(II=',I2,')=',F10.6,' WAS CANCELLED, BECAUSE
                     1IT INDICATED END OF DATA')
 0019             1008 FORMAT (//,' NVAL WAS SET =',I4,///,' *****************')
 0020             1C09 FORMAT (' NVAL IS =',I5)
 0021             1010 FORMAT (I10,A9,I5,D17.8,D16.8,D16.8,D16.8,I12,9X,I3,D16.4)
 0022             1011 FORMAT (' AFTER EVALUATION THE VALUES Y(I) ARE: ',8F10.6)
 0023             1012 FORMAT (' AFTER EVALUATICN THE VALUES ZZ(I) ARE:',8F10.6)
```

```
0024        1013 FORMAT (' AFTER EVALUATION THE VALUES Z(I) ARE: ',8F10.6)
0025        1014 FORMAT (' A SERIES OF X(I) COULD NOT BE MEASURED')
0026        1015 FORMAT ('0LABNUM,J,K,L,LL=',5I4)
0027        1016 FORMAT (' FOR LABNUM=',I3,' THE CODE NUMBER FOR THE ISOTOPIC RATIO
                1 WAS SET=',I3)
0028        1017 FORMAT (' FOR J,K,L,LL=',4I4,' THE VALUES FOR MEAN, SIGMA, SDV AND
                1 RSDV ARE:',F10.7,F14.10,2F10.6)
0029        1018 FORMAT (' A SERIES OF X(I) WAS NOT MEASUREC BY PURPOSE')
0030        1019 FORMAT ('1')
0031        1020 FORMAT (3F7.3,59X)
0032        1021 FORMAT (3F7.3,/)
0033        1022 FORMAT (I1,I2,1X,A2,I1,1X,I2,5(F9.6,1X))
0034        1023 FORMAT ( I2)
0035        1024 FORMAT (///)
0036        1025 FORMAT (' RATIO',I3,'  SAMPLE ',A2)
0037        1026 FORMAT (' LAB',I3,2X,D10.4,4X,D10.4,2X,D9.3,2X,D9.3,3X,D10.4,2X,
                1D9.3,2X,D9.3,3X,D10.4,2X,D9.3,2X,D9.3)
0038        1027 FORMAT ('1RESULTS OF LAB2 FOR ALL THE LABS'/' LAB     MEAN',10X,'V
                1ARIANCE    STAND.DEV. RSD(%) '                  ,
                1                                5X,'VARIANCE    SD',9X,'RSD(%)',6X,'VARI
                2ANCE    SD',9X,'RSD(%)'/23X,'LAB MEAN    LAB MEAN   LAB MEAN', 4
                3X,'RUN',9X,'RUN',8X,'RUN',9X,'SCAN',8X,'SCAN',7X,'SCAN')
0039        1028 FORMAT ('1FOR LAB 16 THE SUBROUTINE LAB4 IS MEANINGLESS.'/' NO CON
                1CENTRATIONS CAN BE CALCULATED,BECAUSE NO SPIKED SAMPLES HAVE BEEN
                2MEASURED.')
0040        1029 FORMAT (I2,F10.5)
          C
          C
          C
          C      CORRECTIONS FOR AM-241 DECAY
          C      THESE CORRECTIONS ARE MADE AT THE EARLIEST POSSIBILITY
          C      SINCE THEY DEPEND ON LAB NO. ETC.,THIS HAS TO BE DONE IN THE MAIN PROGRAM.
          C      DEC OR DC ARE THE TIME INTERVALS BETWEEN SAMPLE PREPARATION
          C      IN GEEL/MOL AND CHEMICAL SAMPLE TREATMENT IN THE LABS.
          C
0041             MM=0
0042             M=2
0043             DEC(M,3,1)=106.
0044             DEC(M,3,2)=132.
0045             DEC(M,3,3)=132.
          C
0046             DEC(M,4,1)=106.
0047             DEC(M,4,2)=106.
0048             DEC(M,4,3)=106.
          C
0049             DEC(M,5,1)=279.
0050             DEC(M,5,2)=288.
0051             DEC(M,5,3)=294.
```

```
                    C
 0052                     DEC(M,6,1)=106.
 0053                     DEC(M,6,2)=125.
 0054                     DEC(M,6,3)=132.
                    C
 0055                     DEC(M,7,1)=140.
 0056                     DEC(M,7,2)=153.
 0057                     DEC(M,7,3)=153.
                    C
 0058                     DEC(M,8,1)=115.
 0059                     DEC(M,8,2)=133.
 0060                     DEC(M,8,3)=117.
 0061                 202 M=3
 0062                     DC(M,3)=80.
 0063                     DC(M,4)=80.
 0064                     DC(M,5)=234.
 0065                     DC(M,6)=83.
 0066                     DC(M,7)=83.
 0067                     DC(M,8)=91.
 0068                     GO TO 1
 0069                 203 M=4
 0070                     DC(M,3)=106.
 0071                     DC(M,4)=106.
 0072                     DC(M,5)=260.
 0073                     DC(M,6)=107.
 0074                     DC(M,7)=90.
 0075                     DC(M,8)=113.
 0076                     GO TO 1
 0077                 204 M=5
 0078                     DC(M,3)=107.
 0079                     DC(M,4)=100.
 0080                     DC(M,5)=261.
 0081                     DC(M,6)=111.
 0082                     DC(M,7)=111.
 0083                     DC(M,8)=122.
 0084                     GO TO 1
 0085                 205 M=6
 0086                     DC(M,3)=98.
 0087                     DC(M,4)=98.
 0088                     DC(M,5)=252.
 0089                     DC(M,6)=111.
 0090                     DC(M,7)=112.
 0091                     DC(M,8)=125.
 0092                     GO TO 1
 0093                 206 M=7
 0094                     DC(M,3)=91.
 0095                     DC(M,4)=98.
 0096                     DC(M,5)=262.
```

```
      DC(M,6)=89.
      DC(M,7)=99.
      DC(M,8)=113.
      GO TO 1
  207 M=8
      DC(M,3)=86.
      DC(M,4)=86.
      DC(M,5)=240.
      DC(M,6)=85.
      DC(M,7)=85.
      DC(M,8)=93.
      GO TO 1
  209 M=10
      DC(M,3)=73.
      DC(M,4)=73.
      DC(M,5)=253.
      DC(M,6)=76.
      DC(M,7)=77.
      DC(M,8)=86.
      GO TO 1
  211 M=12
      DC(M,3)=120.
      DC(M,4)=120.
      DC(M,5)=260.
      DC(M,6)=124.
      DC(M,7)=126.
      DC(M,8)=118.
      GO TO 1
  212 M=13
      DC(M,3)=104.
      DC(M,4)=100.
      DC(M,5)=265.
      DC(M,6)=91.
      DC(M,7)=98.
      DC(M,8)=119.
      GO TO 1
  213 M=14
      DC(M,3)=185.
      DC(M,4)=191.
      DC(M,5)=345.
      DC(M,6)=198.
      DC(M,7)=202.
      DC(M,8)=213.
      GO TO 1
  214 M=15
      DEC(M,3,1)=41.
      DEC(M,3,2)=41.
      DEC(M,3,3)=41.
```

```
                C
 0145                 DEC(M,4,1)=41.
 0146                 DEC(M,4,2)=41.
 0147                 DEC(M,4,3)=41.
                C
 0148                 DEC(M,5,1)=195.
 0149                 DEC(M,5,2)=195.
 0150                 DEC(M,5,3)=245.
                C
 0151                 DEC(M,6,1)=49.
 0152                 DEC(M,6,2)=49.
 0153                 DEC(M,6,3)=49.
                C
 0154                 DEC(M,7,1)=53.
 0155                 DEC(M,7,2)=63.
 0156                 DEC(M,7,3)=53.
                C
 0157                 DEC(M,8,1)=57.
 0158                 DEC(M,8,2)=57.
 0159                 DEC(M,8,3)=57.
 0160             215 M=16
 0161                 DC(M,3)=133.
 0162                 DC(M,4)=192.
 0163                 DC(M,5)=410.
 0164                 GO TO 1
 0165             216 M=17
 0166                 DC(M,3)=117.
 0167                 DC(M,4)=110.
 0168                 DC(M,5)=264.
 0169                 DC(M,6)=117.
 0170                 DC(M,7)=123.
 0171                 DC(M,8)=133.
 0172                 GO TO 1
 0173             217 M=18
 0174                 DC(M,3)=245.
 0175                 DC(M,4)=245.
 0176                 DC(M,5)=428.
 0177                 DC(M,6)=156.
 0178                 DC(M,7)=154.
 0179                 DC(M,8)=274.
 0180                 GO TO 1
 0181             218 M=19
 0182                 DC(M,3)=154.
 0183                 DC(M,4)=155.
 0184                 DC(M,5)=331.
 0185                 DC(M,6)=154.
 0186                 DC(M,7)=154.
 0187                 DC(M,8)=176.
```

```
            GO TO 1
        219 M=20
            DEC(M,3,1)=84.
            DEC(M,3,2)=108.
            DEC(M,3,3)=108.
      C
            DEC(M,4,1)=101.
            DEC(M,4,2)=108.
            DEC(M,4,3)=108.
      C
            DEC(M,5,1)=238.
            DEC(M,5,2)=262.
            DEC(M,5,3)=262.
      C
            DEC(M,6,1)=83.
            DEC(M,6,2)=107.
            DEC(M,6,3)=107.
      C
            DEC(M,7,1)=83.
            DEC(M,7,2)=107.
            DEC(M,7,3)=107.
      C
            DEC(M,8,1)=91.
            DEC(M,8,2)=115.
            DEC(M,8,3)=115.
        220 M=21
            DC(M,3)=108.
            DC(M,4)=108.
            DC(M,5)=262.
            DC(M,6)=107.
            DC(M,7)=107.
            DC(M,8)=115.
            GO TO 1
      C
        221 M=22
            DC(M,3)=345.
            DC(M,4)=345.
            DC(M,5)=495.
            DC(M,6)=348.
            DC(M,7)=348.
            DC(M,8)=356.
      C
      C
          1 DO 726 IB=1,3
            DO 726 IT=3,8
        726 DEC(M,IT,IB)=DC(M,IT)
      C
      C     SPECIAL CASES,INSERTED HERE FOR SIMPLER PROGRAMMING
```

```
0226              DEC(4,7,3)=107.
0227              DEC(17,6,3)=131.
0228              DEC(17,7,3)=131.
0229              DEC(18,7,3)=266.
0230              DEC(19,8,3)=182.
            C
0231              MM=MM+1
0232              GO TO (203,204,205,206,207,209,211,212,213,214,216,217,218,219,221
                 1,222) ,MM
0233          222 CONTINUE
            C
            C
            C     READING OF THE NUMBER OF LABS, TAKEN INTO ACCOUNT
0234              READ(5,1000) NLAB
            C     FOR SHORTER TEST OUTPUT
            C     NLAB=2
            C     PRINT 1002,NLAB
            C
            C     READING OF DATA CARDS,ORDER PRESCRIBED BY DATA SHEETS
            C     DO-LOOP OVER THE DIFFERENT LABS
0235              DO 100  M=1,NLAB
0236              PRINT 1004
0237              READ (5,1023) ILAB(M)
0238              SUMOUT(M)=0
            C     DO-LOOP OVER THE DIFFERENT SAMPLES,MORE THAN 8 BECAUSE OF U AND PU
0239              DO 99 IA=1,14
            C     FOR LAB 23 ONLY URANIUM HAS BEEN MEASURED. SO THE PU  SPIKE SOLUTION
            C     AND ALL PU RATIOS OF THE OTHER SAMPLES HAVE TO BE SKIPPED
0240              IF(ILAB(M).NE.23)  GO TO 20
0241              IRMELA =IA
0242              GO TO (21,99,21,21,21,99,99,99,21,21,21,99,99,99),IRMELA
            C     FOR LAB 16  ONLY SPIKE SOLUTIONS AND UNSPIKED SAMPLES HAVE BEEN MEASURED
0243           20 IF(ILAB(M).NE.16) GO TO 21
0244              IF(IA.GT.8)  GO TO 996
            C     DO-LOOP OVER THE DIFFERENT RUNS
0245           21 DO 98 IB=1,3
            C     DO LOOP OVER THE DIFFERENT ISOTOPIC RATIOS
0246              IRAT=4
0247              DO 97 IC=1,4
0248              LINKS=0
0249              MX=10
0250              NVAL=8
0251              IF(ILAB(M).EQ.15)  GO TO 31
0252              IF(ILAB(M).EQ.18)  GO TO 33
0253           30 READ (5,1001) IEXP(M),ILAB(M),SAMP(M),IRUN(M),IREL(M),(X(I),I=1,5)
0254              GO TO 32
0255           31 READ (5,1022) IEXP(M),ILAB(M),SAMP(M),IRUN(M),IREL(M),(X(I),I=1,5)
            C
```

```
                C      CHECKING OF THE ARTIFICIAL END OF FILE
 0256              32 IF(IEXP(M).EQ.9) GO TO 101
 0257                 GO TO 34
 0258              33 CALL COR(ILAB,SAMP,IRUN,IREL,X,IB,M,ITYPE,IEXP,      Y,A,NAUT,SUMO
                     1UT,MEAN,SIGMA,SD,RSD,SQI,SUMM,DEC)
 0259                 NOUT=NAUT
 0260                 GO TO 79
                C      'TRANSLATION' OF THE SAMPLE TYPE
 0261              34 DO 2 I=1,8
 0262                 II=I
 0263                 IF(SAMP(M).EQ.TYP(I)) GO TO 3
 0264               2 CONTINUE
 0265               3 ITYPE(M)=II
                C      PRINT 1005,(TYP(I),I=1,8),SAMP(M),ITYPE(M)
                C
                C      SOMETIMES SOME RATIOS WERE NOT MEASURED
                C      IF THEY COULD NOT BE MEASURED,X(1) IS PUT IN AS  -1.
                C      IF IT WAS DECIDED NOT TO MEASURE THEM (BECAUSE E.G. FOR PU 238 ALPHA
                C      SPECTROMETRY WAS PREFERRED), X(1) IS PUT IN AS 9.9
 0266                 IF(X(1).GT.9.) GO TO 76
 0267                 IF(X(1).LT.0.)  GO TO 77
                C
                C      TEST IF THERE ARE LESS THAN 5 MEASURING RESULTS
 0268                 DO 44 I=1,5
 0269                 II=I
 0270                 IF(X(I).GT.9.) GO TO 45
 0271              44 CONTINUE
 0272                 GO TO 46
 0273              45 MX=II-1
                C      PRINT 1007,II,X(II)
 0274                 GO TO 47
 0275              46 IF(ILAB(M).EQ.15)  GO TO 466
 0276                 READ (5,1001) IEXP(M),ILAB(M),SAMP(M),IRUN(M),IREL(M),(X(I),I=6,10
                     1)
 0277                 GO TO 467
 0278             466 READ (5,1022) IEXP(M),ILAB(M),SAMP(M),IRUN(M),IREL(M),(X(I),I=6,10
                     1)
                C
                C      TEST IF THERE ARE LESS THAN 10 MEASURING RESULTS
 0279             467 DO 4 I=6,MX
 0280                 II=I
 0281                 IF(X(I).GT.9.) GO TO 5
 0282               4 CONTINUE
 0283                 GO TO 47
 0284               5 MX=II-1
                C      PRINT 1007,II,X(II)
 0285              47 PRINT 1002,ILAB(M),SAMP(M),IRUN(M),IREL(M)
                CC     PRINT 1003,(X(I),I=1,II)
```

```
                C
                C      X(I) ARE THE ISOTOPIC RATIOS IN ORIGINAL CRDER
                C      Y(I) ARE THE ISOTOPIC RATIOS FOR FURTHER CALCULATIONS, COMING FROM
                C      DIXON
                C      ZZ(I) ARE THE ISOTOPIC RATIOS FOR FURTHER CALCULATICNS,COMING FROM
                C      CHAUV1
                C      Z(I) ARE THE ISOTOPIC RATIOS FOR FURTHER CALCULATICNS, COMING FROM
                C      CHAUV2
                C      IF THERE ARE LESS THAN 8 INPUT VALUES,NC CUTLIER CRITERIA ARE APPLIED
                C
0286                49 IF(MX.GE.NVAL) GO TC 6
0287                   NOUT=0
0288                   NVAL=MX
                C      PRINT 1008,NVAL
0289                   DO 66  I=1,NVAL
0290                66 A(I)=X(I)
0291                   GO TO 75
0292                 6 CALL DIXON(X,Y,NOUT)
0293                   SUMOUT(M)=SUMOUT(M)+NOUT
                C      THE CHOSEN RESULTS ARE PASSED TO THE NEXT PROGRAM UNIT
                C      PRINT 1011,(Y(I),I=1,NVAL)
                C      CALL CHAUV2(X,Z)
                C      PRINT 1013,(Z(I),I=1,NVAL)
0294                   DO 7 I=1,NVAL
0295                 7 A(I)=Y(I)
                C
                C
                C
                C      THE AM-241 CORRECTIONS APPLY ONLY TO THE RATIO 241/239
                C      OF THE SAMPLES AU,BU,RU WITH ITYPE(M) = 3,4,5
0296                75 IF(IREL(M).NE.19) GO TO 729
0297                   IF(ITYPE(M).LT.3) GO TO 729
0298                   IF(ITYPE(M).GT.8) GO TO 729
0299                   IT=ITYPE(M)
0300                   MIT=ILAB(M)
0301                   FACT= (DEC(MIT,IT,IB) * 0.693)/(15.1 * 365.)
0302               727 DO 728 I=1,NVAL
                C      THE INDECES HAVE THE FOLLOWING MEANING:
                C      M-LAB,IT-SAMPLE,IB-RUN
0303                   A(I)=A(I) * DEXP(FACT)
0304               728 CONTINUE
0305               729 CONTINUE
                C
                C
                C
                C      FOR THE LABS 5 AND 13 MASS DISCRIMINATION CORRECTIONS
                C      HAVE TO BE APPLIED  16.4.74
0306                   IF(ILAB(M).EQ.5) GO TO 730
```

```
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 0307                   IF(ILAB(M).EQ.13) GO TO 740
 03C8                   GO TC 754
                  C
                  C
                  C     LAB 5
 0309               730 MDC=1.
 0310                   IF(IREL(M).NE.83) GO TO 731
 0311                   MDC=1.00247
 0312               731 IF(IREL(M).NE.38) GO TO 732
 0313                   MDC=0.99754
 0314               732 IF(IREL(M).NE.48) GO TO 733
 0315                   MDC=0.99803
 0316               733 IF(IREL(M).NE.58) GO TO 734
 0317                   MDC=0.99853
 0318               734 IF(IREL(M).NE.68) GO TO 735
 0319                   MDC=0.99902
 0320               735 DO 736 I=1,NVAL
 0321               736 A(I)=A(I) * MDC
 0322                   GO TO 754
                  C
                  C     LAB 13  --  IN THIS CASE THE CORRECTIONS PARTLY
                  C     DEPEND ON THE ISOTOPIC ABUNDANCIES
 0323               740 MDC=1.
                  C     URANIUM
 0324                   IF(IREL(M).NE.83) GC TO 741
 0325                   MDC=1.0036
 0326               741 IF(IREL(M).NE.38) GO TO 742
 0327                   MDC=0.9871
 0328               742 IF(IREL(M).NE.48) GO TO 743
 0329                   MDC=0.99989
 0330               743 IF(IREL(M).NE.58) GO TO 744
 0331                   IF(ITYPE(M).LT.8)  MDC=0.99785
 0332                   IF(ITYPE(M).EQ.5) MDC=0.99979
 0333                   IF(ITYPE(M).EQ.8) MDC=0.99979
 0334               744 IF(IREL(M).NE.68) GC TO 745
 0335                   MDC=0.99994
                  C
                  C     PLUTONIUM
 0336               745 IF(IREL(M).NE.92) GO TO 747
 0337                   MDC=0.99991
 0338               747 IF(IREL(M).NE.02) GO TO 748
 0339                   MDC=0.99992
 0340               748 IF(IREL(M).NE.09) GC TO 749
 0341                   IF(ITYPE(M).LT.8) MDC=1.00213
 0342                   IF(ITYPE(M).EQ.5) MDC=1.0009
 0343                   IF(ITYPE(M).EQ.8) MDC=1.0009
 0344               749 IF(IREL(M).NE.19) GO TO 750
 0345                   IF(ITYPE(M).LT.8) MDC=1.00335
```

```
            IF(ITYPE(M).EQ.5) MDC=1.00008
            IF(ITYPE(M).EQ.8) MDC=1.00012
        750 IF(IREL(M).NE.29) GO TO 751
            IF(ITYPE(M).LT.5) MDC=1.00216
            IF(ITYPE(M).GT.5) MDC=1.00847
        751 DO 752 I=1,NVAL
        752 A(I)=A(I) * MDC
      C
        754 CONTINUE
      C
      C
            IF (NVAL.GT.1)  GO TO 755
            MEAN = A(1)
            GO TO 788
      C     LAB1 IS CALLED ONLY IF THERE ARE MORE THAN ONE SCANNING RESULTS PER
      C     RATIO
        755 CALL LAB1 (A,MEAN ,SIGMA ,SD ,RSD,SQI,SUMM)
            GO TO 79
      C
      C     IF NO MEASURING RESULTS EXIST,NVAL MUST BE SET =0 .
      C     MEAN,SIGMA,SD AND RSD ARE SET =0.  IN THIS CASE.
         76 NVAL=0
            MX=0
            NOUT=0
            PRINT 1002,ILAB(M),SAMP(M),IRUN(M),IREL(M)
            PRINT 1018
            GO TO 78
         77 NVAL=0
            NOUT=0
            MX=0
            PRINT 1002,ILAB(M),SAMP(M),IRUN(M),IREL(M)
            PRINT 1014
         78 MEAN=0.
        788 SIGMA=0.
            SD=0.
            RSD=0.
      C
         79 J=IEXP (M)
            K=ITYPE (M)
            L=IRUN (M)
            DO 8  I=1,11
            II=I
            IF (IREL(M).EQ.IR(I))GO TO 9
          8 CONTINUE
          9 IRE (M)=II
      C     PRINT 1016,M,IRE (M)
            LL=IRE (M)
      C     PRINT 1015,M,J,K,L,LL
```

```
      C      M IS THE RUNNING NUMBER FOR THE LAB
      C      J IS THE NUMBER OF THE PART OF THE EXPERIMENT
      C      K IS THE CODE FOR THE SAMPLE TYPE, E.G. FOR US OR BU, SEE REAL TYP
      C      L IS THE RUN-INDEX
      C      LL IS THE CODE FOR THE ISOTOPIC RATIO, SEE REAL*8 IR(11)
      C      THE NAMES GET A 'V' AT THE END TO INDICATE THAT THEY ARE VECTORS
             MEANV(M,K,L,LL)=MEAN
             SIGMAV(  K,L,LL)=SIGMA
             SDV(  K,L,LL)=SD
             RSDV(  K,L,LL)=RSD
             SQIV(  K,L,LL)=SQI
             NAUS(  K,L,LL)=NOUT
             SUMV(M,K,L,LL) = SUMM
      C      PRINT 1017,J,K,L,LL,MEANV(M,K,L,LL),SIGMAV(  K,L,LL),SDV(  K,L,LL)
      C     1,RSDV(  K,L,LL)
             IF (NVAL.LT.8)  GO TO 95
             GO TO 96
          95 CONTINUE
      C   95 PRINT 1009,NVAL
          96 MVAL(  K,L,LL)=NVAL
             LVAL(K,L,LL)=MX
         966 MVALV(M,K,L,LL)=NVAL
      C
      C      CONSICERATIONS FOR SPECIAL CASES OF INPUT DATA
      C      FOR US-SAMPLES ONLY ONE ISOTOPIC MEASUREMENT (38/33)
             IF (ITYPE(M).EQ.1) IRAT=1
      C      FOR PS-SAMPLES ONLY TWO ISOTOPIC MEASUREMENTS(39/42 AND 40/42)
             IF (ITYPE(M).EQ.2) IRAT=2
             IF (IRAT.EQ.IC) GO TO 98
          97 CONTINUE
          98 CCNTINUE
          99 CONTINUE
         996 PRINT 1006,ILAB(M) ,SUMOUT(M)
      C
      C      DO LOOPS FOR THE OUTPUT LIST I
      C      THE ORDER WAS PRESCRIBED FOR THIS LIST
      C      DO LOOP OVER THE DIFFERENT ISOTOPIC RATIOS
             DO 999  LL=1,11
      C      DO LOOP OVER THE DIFFERENT SAMPLE TYPES
             DO 998  K=1,8
      C      DO LOOP OVER THE DIFFERENT RUNS
             DO 997  L=1,3
      C      THE VECTOR MEANV IS READ IN AS REAL*8 WITH ALL COMPCNENTS=-3.
      C      TRICK FOR STEERING THE OUTPUT
             IF (MEANV(M,K,L,LL).LT.-2.) GO TO 997
             PRINT 1010 ,     IR(LL),TYP(K),L,MEANV(M,K,L,LL),SIGMAV(  K,L,LL),
            1SDV(K,L,LL),RSDV(K,L,LL),LVAL(K,L,LL),NAUS(K,L,LL)
         997 CONTINUE
```

```
      998 CONTINUE
      999 CONTINUE
          CALL LAB2 (MEANV,SQIV,M,IR,TYP,ILAB,MVAL,MEAN2,IFILIV)
          CALL LAB3 (MEAN2,M,IR,TYP,ILAB,NALPHA,WALPHA)
          IF(ILAB(M).EQ.16)  GO TO 80
          CALL LAB4 (MEAN2,M ,MEANV,NALPHA,WALPHA,ILAB,TYP)
          GO TO 100
       80 PRINT 1028
      100 CONTINUE
          CALL LAB5(NLAB,MVAL V,IFILIV,MEANV,SUMV,IR,TYP,ILAB)
          CALL LAB6(MEANV,IR,TYP,ILAB,MEAN2,IFIL IV,NLAB)
C
C         PRINTING OF A COMBINED TABLE OF RESULTS OF LAB2 FOR ALL LABS
C         IF (NLAB.GT.0) GO TO 101
C         NONSENSE CONDITION IN ORDER TO SKIP THE FOLLOWING PRINT STATEMENTS
          PRINT 1027
          L2=1
C         DO-LOOP OVER THE ISOTOPIC RATIOS
          DO 199 L=1,13
          LL2=L
          IF(L.EQ.2) GO TO 199
          IF(L.EQ.3)  GO TO 199
          IF(L.EQ.8) LL2=2
          IF(L.EQ.9) LL2=3
          IF(L.GT.9) LL2=L-2
C         EXTRA BLOCK FOR PLUTONIUM RESULTS
          IF(L.EQ.8)  PRINT 1024
C         DO-LOOP OVER THE SAMPLE TYPES
          DO 198  K2=1,8
C         TRICK FOR ORGANISATION OF THE OUTPUT LIST
          IF (MEANV( 2,K2,L2,LL2).LT.-2.)  GO TO 198
          PRINT 1025 ,IR(LL2),TYP(K2)
          DO 197  M2=1,NLAB
          PRINT 1026,ILAB(M2),MEAN2(M2,K2,LL2),SG2V(M2,K2,LL2),SDGV(M2,K2,LL
         12),RSDGV(M2,K2,LL2),                    SIGA2V(M2,K2,LL2),SDAV(M2,K2
         2,LL2),RSDAV(M2,K2,LL2)  ,SIGE2V(M2,K2,LL2),SDEV(M2,K2,LL2),  RSDEV
         3(M2,K2,LL2)
      197 CONTINUE
      198 CONTINUE
      199 CONTINUE
C
C         AT THIS POINT THE ADDITIONAL EXPERIMENTS WILL BE CONNECTED WITH
C         THE STANDARD EXPERIMENT.
      200 IDER=0
          PRINT 1002,IDER
C         CORRECTION FACTORS FOR LAB 18 - DRY SPIKE EXPERIMENT
          DICO(1)=0.9946
          DICO(2)=1.0033
```

```
FORTRAN IV G1  RELEASE 2.0              MAIN              DATE = 75015          13/37/58

 0442                     DO 103  M=1,NLAB
 0443                     READ (5,1029)  ILAB(M),TEST
 0444                     IF(TEST.GT.7.9)  GO TO 103
 0445                     CALL DRY(M,MEAN2,ILAB,DICO)
 0446                 103 CONTINUE
                C
                C         CORRECTION FACTORS FOR LAB 18 - ALU-I-EXPERIMENT
 0447                     DICO(1)=1.
 0448                     DICO(2)=1.006
 0449                     DO 104 M=1,NLAB
 0450                     READ(5,1029) ILAB(M),TEST
 0451                     IF(TEST.GT.7.9) GO TO 104
 0452                     CALL CRY(M,MEAN2,ILAB,DICO)
 0453                 104 CONTINUE
 0454                     PRINT 1002,IDER
 0455                     IDER=IDER + 1
 0456                     PRINT 1002,IDER
                C         FOR INCLUSION OF ALU - -EXPERIMENT
                C         IF(IDER.EQ.1) GO TO 200
                C
 0457                 101 CONTINUE
                C
 0458                     STOP
 0459                     END
```

```
FORTRAN IV G1  RELEASE 2.0              BLK DATA            DATE = 75015            13/37/58

 0001                      BLOCK DATA
                    C
                    C
                    C
                    C
                    C
                    C
 0002                       COMMON /HANNA / LINKS,MX,NVAL
                           1/ITEMS/SG2V(21,8,11),SDGV(21,8,11),RSDGV(21,8,11),RSDCOV(21,8,11),
                           1SIGA2V(21,8,11),SDAV(21,8,11),RSDAV(21,8,11),SIGE2V(21,8,11),SDEV
                           2(21,8,11),RSDEV(21,8,11),DIFV(21,8,11)
                           3/DRYA/ KO(21,3,5,2),KOAL(21,3,5,2)
 0003                       REAL * 8 SG2V/1848*C./,SDGV/1848*0./,RSDGV/1848*0./,RSDCOV/1848*0.
                           1/,SIGA2V/1848*0./,SDAV/1848*0./,RSDAV/1848*0./,SIGE2V/1848*C./,
                           2SDEV/1848*0./,RSDEV/1848*0./,DIFV/1848*0./,KO,KOAL
 0004                       END
```

```
FORTRAN IV G1  RELEASE 2.0            DIXON              DATE = 75015          13/37/58

                SUBROUTINE DIXON(X,Y,NOUT)
      C
      C
      C
      C
      C
      C
      C         APPLICATION OF THE DIXON CRITERION FOR OUTLIERS
      C
                COMMON /HANNA / LINKS,MX,NVAL
                REAL *8    X(10),Y(10),S(10),F(3),T(10),D,DIX,R,D1,DN,DN1,DN2
      C
       1001 FORMAT (' DN1 IS =0.')
       1002 FORMAT (' DN2 IS =0.')
       1003 FORMAT (/,' APPLICATION OF THE DIXON CRITERION')
       1004 FORMAT (' R=',F10.6,' LINKS=',I2,' NX=',I3)
       1005 FORMAT (' THE MAXIMUM VALUE S(',I3,')=',F9.6,' IS CANCELLED')
       1006 FORMAT (' THE MINIMUM VALUE S(1)=',F9.6,' IS CANCELLED')
       1007 FORMAT (' THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
          1',/,40X,8F10.6)
       1008 FORMAT (' THE ORDERED VALUES S(I) ARE: ',10F9.6)
       1009 FORMAT (' D1,DN,DN1,DN2,D= ',5F10.6)
       1010 FORMAT(' ********** THE 8TH INPUT VALUE IS AN OUTLIER*******')
       1011 FORMAT (' THE RESULTING VALUES X(I) ARE',10X,8F10.6)
       1012 FORMAT (/' BEGIN OF A NEW TEST SERIES WITH DIFFERENT ALPHA')
       1013 FORMAT (' R,DIX AND K ARE:',2F14.6,I3)
       1014 FORMAT (' THE NUMBER OF OUTLIERS IS',I5)
       1015 FORMAT (' THE DIXON INPUT VALUES ARE',10F9.6)
      C
                NX=MX
      C         PRINT 1003
                DO 5  II=1,NX
              5 T(II)=X(II)
      C         PRINT 1015,(T(II),II=1,NX)
              6 CONTINUE
                DO 7  I=1,3
              7 F(I)=99.
                K=0
      C         ORDERING OF INPUT VALUES
      C         T(I) ARE THE ISOTOPIC RATIOS ORDERED, BEGINNING WITH THE SMALLEST
      C         THE VECTOR T(I) HAS TO BE DEFINED BEFORE THE ORDERING PROCEDURE
                NXX=NX
              8 CALL MINL(T,NXX)
                PRINT 1008,(T(I),I=1,NX)
                NX=MX
                LINKS=0
                NOUT=0
                DO 88 II=1,NX
```

```
FORTRAN IV G1  RELEASE 2.0              DIXON               DATE = 75015          13/37/58

              88 S(II)=T(II)
               9 D1=S(2)-S(1)
                 DN=S(NX)-S(NX-1)
                 DN1=S(NX-1)-S(1)
                 DN2=S(NX)-S(2)
                 D=D1-DN
          C      PRINT 1009,D1,DN,DN1,DN2,D
                 IF(DN1.LT.0.0000009) GO TO 112
             116 IF(DN2.LT.0.0000009) GO TO 113
                 GO TO 111
             112 CONTINUE
          C 112 PRINT 1001
                 IF(D1.GT.0.000000)  GO TO 114
                 GO TO 116
             114 R=0.5
                 IF(D) 13,13,116
             113 CONTINUE
          C 113 PRINT 1002
                 IF (DN.GT.0.000000)  GO TO 115
                 GO TO 23
             115 R=0.5
                 LINKS=1
                 GO TO 13
          C
          C      EVALUATION OF EXTREMA AND DECISION, WHERE AN OUTLIER IS MORE PROBA
          C      IF D IS POSITIVE, THE OUTLIER LIES AT THE LEFT END
             111 IF (D) 10,12,12
              12 R=D1/DN1
                 GO TO 13
              10 R=DN/DN2
                 LINKS=1
          C      THIS PARAMETER IS A HINT TO THE LEFT PART OF THE FLOWSHEET; AN OUT
          C      WITH A HIGH VALUE IS ASSUMED, IF LINKS=1
          C   13 PRINT 1004,R,LINKS,NX
              13 CONTINUE
          C
          C      APPLICATION OF THE CRITERION FOR 8,9 AND 10 INPUT VALUES
                 IF(NX-9) 14,15,16
          C      THESE DIX-VALUES CORRESPOND TO THE PROBABILITY 1-ALPHA =0.95
              14 DIX=0.554
                 K=3
          C      K IS THE NUMBER OF THE OUTLIER FOUND FOR THIS SERIES OF VALUES
                 GO TO 17
              15 DIX=0.512
                 K=2
                 GO TO 17
              16 DIX=0.477
                 K=1
```

```
C  17 PRINT 1013,R,DIX,K
   17 CONTINUE
      IF (R-DIX) 26,18,18
   18 IF(K.EQ.3) PRINT 1010
      NOUT=NOUT+1
      IF (LINKS.NE.1) GO TO 20
      IF(K.EQ.3) GO TO 23
   19 PRINT 1005,NX,S(NX)
C  19 CONTINUE
      F(K)=S(NX)
      NX=NX-1
      LINKS=0
      GO TO 9
   20 IF(K.EQ.3) GO TO 23
      PRINT 1006,S(1)
      F(K)  =S(1)
      NN=NX-1
      DO 22 I=1,NN
      S(I)=S(I+1)
   22 CONTINUE
      NX=NX-1
      GO TO 9
C
C     IF THERE ARE NO OUTLIERS, THE FIRST 8 VALUES ARE USED FROM HERE ON
   26 IF (K.NE.1) GO TO 23
      PRINT 1007,(X(I),I=1,NVAL)
      DO 27 I=1,NVAL
   27 Y(I)=X(I)
      GO TO 99
   23 II=0
      DO 25 I=1,MX
      DO 24 J=1,3
      IF(X(I).NE.F(J)) GO TO 24
      F(J) = 99.
      GO TO 25
   24 CONTINUE
      II=II+1
      Y(II)=X(I)
   25 CONTINUE
      PRINT 1011,(Y(I),I=1,NVAL)
   99 CONTINUE
      IF(NOUT.LE.0)  GO TO 21
      INSEL=1
      PRINT 1014,NOUT
   21 CONTINUE
      RETURN
      END
```

```
FORTRAN IV G1  RELEASE 2.0            MINL              DATE = 75015          13/37/58

0001                    SUBROUTINE MINL (T,NXX)
               C
               C
               C
               C
               C
               C
               C        THIS SUBROUTINE PUTS DOUBLE PRECISION FLOATING POINT NUMBERS
               C        (VECTOR T(NXX) ) IN ASCENDING ORDER
               C
0002                    REAL*8 R(10),MINI,KK,T(10)
               C
0003            1000 FORMAT (' NXX AND THE MINL INPUT VALUES ARE',I3,10F9.6)
               C
               C
               C        NOTE  THE INPUT-VECTOR
0004                    DO 10 I=1,NXX
0005                    R(I) = T(I)
0006              10 CONTINUE
               C        PRINT 1000,NXX,(R(I),I=1,NXX)
               C        MARKER FOR SCANNING THE INPUT NUMBERS
0007                    LOOP=0
0008             300 LOOP=LOOP+1
0009                    L=0
0010                    I=1
0011                    N=1
               C        THE 1. INPUT VALUE IS EXPERIMENTALLY CALLED THE MINIMUM
0012                    MINI = R(I)
0013             100 I=I+1
0014                    KK=MINI-R(I)
               C        TEST IF THE NEXT NUMBER IS SMALLER THAN THE PRESENT MINIMUM
0015                    IF(KK)200,200,20
0016              20 MINI=R(I)
0017                    N=I
0018             200 L=I-NXX
0019                    IF(L)100,30,100
               C        NOTE  THE MINIMUM, CONSTRUCT THE OUTPUT VECTOR
0020              30 T(LOOP)=MINI
0021                    R(N)=10.
               C        NUMBERS WHICH HAVE BEEN TESTED ARE PUT OUT OF USE, 10 IS BIGGER
               C        THAN ALL ACTUAL INPUT VALUES
0022                    LOOPO=LOOP-NXX
0023                    IF(LOOPO)300,400,300
0024             400 CONTINUE
0025                    RETURN
0026                    END
```

```
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 0001                   SUBROUTINE COR(ILAB, SAMP, IRUN, IREL, X,IB,  M, ITYPE, IEXP,
                       1      Y, A, NAUT, SUMOUT, MEAN, SIGMA, SD, RSD, SQI, SUMM,DEC)
                C
                C
                C
                C
                C
                C
                C       CORRECTICNS FOR LAB 18 SPECIALLY
                C       FOR THIS LAB THE MEASURED VALUES ARE READ IN AS B(I) AND CORRECTED
                C       BY MULTIPLICATION WITH THE FACTOR CO.IF CO=0,THE GIVEN INPUT VALUES ARE
                C       CORRECT.
                C       THE FACTOR CO IS GIVEN IN COLUMNS 61-70 OF THE SECOND INPUT CARD
                C       FOR EACH MEASURING SERIES
                C       IN ADDITION THEY ARE MULTIPLIED BY THE MASS DISCRIMINATION CORRECTION
                C       FACTOR DICO WHICH DEPENDS ON THE ISOTOPIC RATIO.
                C       THE ISOTOPIC RATIOS ARE READ IN AS IREL(M) AND ARE COMPARED WITH THE LIST
                C       OF RATIOS GIVEN IN AS THE VECTOR IR(1-11). IREL(M) = 83 CORRESPONDS E.G.
                C       TO THE RATIO U238/233  AND IS THE VECTOR COMPONENT IR(1).
                C       THE CORRESPONDING CORRECTION FACTOR DICO IS TRANSMITTED AS MD(1)
                C
                C       CORRESPONDING COMMENTS CAN BE FOUND IN THE PARALLEL PART OF THE MAIN
                C       PROGRAM
                C
                C
                C
 0002                   REAL*8 SIGMA, SQI, MEAN, X(10), Y(10), A(8), B(10)
 0003                   DIMENSION ILAB(21), SAMP(21), IRUN(21), IREL(21), ITYPE(21),IEXP
                       1(21)
 0004                   REAL TYP(8)/'US  ','PS  ','AU  ','BU  ','RU  ','AS  ','BS  ','RS
                       1'/
 0005                   INTEGER IR(11) /83,92,02,38,48,58,68,89,09,19,29/
 0006                   INTEGER * 2 SUMOUT (21)
 0007                   REAL * 8  MD(11),CO,DICO,SD,RSD,SUMM,DEC(22,8,3),FACT
                C
 0008                   COMMON / HANNA / LINKS,MX,NVAL
 0009              1001 FCRMAT (I1,I2,1X,A2,I1,1X,I2,5F10.6)
                C
 0010              1000 FORMAT (I2)
 0011              1002 FCRMAT (/ I3, 2X, A2, I1, 1X, I2)
 0012              1003 FORMAT (I1, I2, 1X, A2, I1, 1X, I2, 6F10.6)
 0013              1004 FORMAT (' DICO=',F10.4)
 0014              1005 FORMAT (' TYP(I=1....8)=',8(A2,2X),',SAMP(M) AND ITYPE(M)=',A2,I3)
 0015              1006 FORMAT (F11.8)
 0016              1007 FCRMAT (' THE VALUE X(II=',I2,')=',F10.6,' WAS CANCELLED, BECAUSE
                       1IT INDICATED END OF DATA')
 0017              1008 FORMAT (//,' NVAL WAS SET =',I4,///,' *****************')
 0018              1009 FORMAT (' CO=',F10.6)
```

```
      1014 FORMAT (' A SERIES OF X(I) COULD NOT BE MEASURED')
      1018 FORMAT (' A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE')
      1022 FORMAT (I1,I2,1X,A2,I1,1X,I2,5(F9.6,1X))
C
           READ (5,1001) IEXP(M), ILAB(M), SAMP(M), IRUN(M), IREL(M), (B(I),
          1I=1,5)
        34 DO 2 I=1,8
           II=I
           IF(SAMP(M).EQ.TYP(I)) GO TO 3
         2 CONTINUE
         3 ITYPE(M)=II
           IF(E(1).CT.9.) GO TO 76
           IF(B(1).LT.0.) GO TO 77
           DO 44 I=1,5
           II=I
           IF(B(I).GT.9.) GO TO 45
        44 CONTINUE
           GO TO 46
        45 MX=II-1
           GO TO 47
        46 CONTINUE
           READ (5,1003) IEXP(M),ILAB(M),SAMP(M),IRUN(M),IREL(M),(B(I),I=6,10
          1), CO
       467 DO 4 I=6,MX
           II=I
           IF(B(I).GT.9.) GO TC 5
         4 CONTINUE
           GC TC 47
         5 MX=II-1
        47 PRINT 1002,ILAB(M),SAMP(M),IRUN(M),IREL(M)
C       47 CCNTINUE
           MD(1)=1.0056
C          PU - CORRECTIONS ACCORDING TO LETTER FROM APRIL 3,1973
           MD(2)=0.9940
           MD(3)=0.9960
           MD(4)=0.9946
           MD(5)=0.9956
           MD(6)=0.9967
           MD(7)=0.9878
           MD(8)=0.9989
           MD(9)=1.002
           MD(10)=1.004
           MD(11)=1.006
           DICO =1.
           DO 8 I=1,11
           IK=I
           IF(IREL(M).EQ.IR(I))  GO TO 9
         8 CONTINUE
```

```
      9 DICO=MD(IK)
C       PRINT 1004,DICO
        IF (CO.LE.0.)  CO = 1.
C       PRINT 1009,CO
        DO 50  I=1,II
     50 X(I) = B(I) * CO * DICO
C       PRINT 1006,(B(I),I=1,II)
C       PRINT 1006,(X(I),I=1,II)
        IF(MX.GE.NVAL) GO TO 6
        NVAL=MX
        DO 66  I=1,NVAL
     66 A(I)=X(I)
        GO TO 75
      6 CALL DIXON(X,Y,NOUT)
        NAUT=NOUT
        SUMOUT(M)=SUMOUT(M)+NOUT
        DO 7 I=1,NVAL
      7 A(I)=Y(I)
C
C
C       AM-CORRECTIONS,SEE MAIN PROGRAM
     75 IF(IREL(M).NE.19) GO TO 729
        IF(ITYPE(M).LT.3) GO TO 729
        IF(ITYPE(M).GT.8) GO TO 729
        IT=ITYPE(M)
        MIT=ILAB(M)
        FACT=(DEC(MIT,IT,IB)*0.693)/(15.1 * 365.)
    727 DO 728 I=1,NVAL
        A(I)=A(I) * DEXP(FACT)
    728 CONTINUE
    729 CONTINUE
C
C
        IF (NVAL.GT.1)  GO TO 755
        MEAN = A(1)
        GO TO 788
    755 CALL LAB1 (A,MEAN ,SIGMA ,SD ,RSD,SQI,SUMM)
        GO TO 79
     76 NVAL=0
        PRINT 1002,ILAB(M),SAMP(M),IRUN(M),IREL(M)
        PRINT 1018
        GO TO 78
     77 NVAL=0
        PRINT 1002,ILAB(M),SAMP(M),IRUN(M),IREL(M)
        PRINT 1014
     78 MEAN=0.
    788 SIGMA=0.
        SD=0.
```

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```
      RSD=0.
   79 CONTINUE
      RETURN
      END
```

```
0001          SUBROUTINE LAB1 (A,MEAN , SIGMA ,SD ,RSD,SQI,SUMM)
        C
        C
        C
        C
        C
        C
        C     THIS SUBROUTINE CALCULATES THE MEAN VALUE MEAN, THE VARIANCE SIGMA,THE
        C     STANDARD DEVIATION SD, AND THE RELATIVE STANDARD DEVIATION RSD FOR EACH
        C     ISOTOPIC RATIO AND EACH RUN
        C     THIS SERIES OF RESULTS IS GIVEN FOR EACH LAB.
        C     THE RESULTS OF THIS SUBROUTINE ARE PRINTED IN THE MAIN PROGRAM
        C
0002          REAL*8 D,SIG,SIGMA,A(8),MEAN,SD,RSD,SQI,SUM,D,SUMM
0003          COMMON /HANNA / LINKS,MX,NVAL
        C
0004     1000 FORMAT (' MEAN=',D12.6,' A(I)= ',8F10.6)
        C
        C
0005       22 SUM=0.
0006          SUMM=0.
0007          DO 3 I=1,NVAL
0008          SUMM=SUMM+A(I)**2
0009        3 SUM=SUM+A(I)
0010        4 MEAN=SUM/NVAL
0011          SQI=0.
0012          DO 6 I=1,NVAL
0013          D=A(I) - MEAN
0014        6 SQI=SQI+D**2
0015          SIGMA=SQI/(NVAL-1)
0016          SD=DSQRT (SIGMA)
0017          IF (SD.LT.0.000000)  GO TO 10
0018          IF (MEAN.LE.0)  GO TO 9
0019          RSD=(SD/MEAN)* 100.
0020          GO TO 11
0021        9 PRINT 1000,MEAN,(A(I),I=1,NVAL)
0022       10 RSD=0.
0023       11 CONTINUE
0024          RETURN
0025          END
```

```
0001                  SUBROUTINE LAB2 (MEANV,SQIV,M,IR,TYP,ILAB,MVAL,MEAN2,IFILIV)
                C
                C
                C
                C
                C
                C
                C     THIS SUBROUTINE CALCULATES FOR EACH LAB THE MEAN, SIGMA, SD AND RSD
                C     FOR ALL THE ISOTOPIC RATIOS OF EACH MEASURED SAMPLE.
                C     IN ADDITION IT GIVES THE RUN-AND SCAN-COMPONENTS OF SIGMA,SD AND RSD
                C
                C     M - LAB
                C     K2 - SAMPLE TYPE
                C     L2 - RUN
                C     LL2 - ISOTOPIC RATIO
                C
                C
0002                  REAL * 8  SQIV(  8,3,11),MEANV(21,8,3,11),MEANA,MEAN2(21, 8,11),SU
                     1M,SUMA,SQL,SG2,SDG,RSDG,SQA,SQR,SIGA2,SDA,SIGE2,SDE,RSDE,RSDCON,DI
                     2FF,RSDA
0003                  DIMENSION ILAB(21),IR(11),TYP( 8)
0004                  INTEGER * 2   IFILIV(21,8,11),MVAL(8,3,11)
0005                  COMMON /HANNA / LINKS,MX,NVAL
                     1/ITEMS/SG2V(21,8,11),SDGV(21,8,11),RSDGV(21,8,11),RSDCOV(21,8,11),
                     1SIGA2V(21,8,11),SDAV(21,8,11),RSDAV(21,8,11),SIGE2V(21,8,11),SDEV
                     2(21,8,11),RSDEV(21,8,11),DIFV(21,8,11)
0006                  REAL*8 SG2V,SDGV,RSDGV,RSDCOV,SIGA2V,SDAV,RSDAV,SIGE2V,SDEV,RSDEV,
                     1DIFV
                C
                C
                C
0007             1000 FORMAT(//'1RESULTS OF PROGRAM LAB2 FOR THE STANDARD EXPERIMENT'//
                     1' FOR EACH LAB AND FOR EACH SAMPLE AND ISOTOPIC RATIO THE FOLLOWIN
                     3G VALUES ARE GIVEN:'/' LAB MEAN(MEANA) WITH VARIANCE(SG2),STANDARD
                     4 DEVIATION(SDG) AND RELATIVE STANDARD DEVIATION(RSDG).'/' IN ADDIT
                     5ION VARIANCE COMPONENTS FOR RUN AND SCAN ARE GIVEN SEPARATELY .'//
                     6 ' (IF THE RUN OR SCAN COMPONENT OF ANY VARIANCE IS NEGATIVE ',
                     7    ' AND THEREFORE HAS TO BE CONSIDERED AS NEGLIGIBLE,'/
                     8 ' IT IS PUT = -5.0 (RUN) OR = -4.0 (SCAN),RESPECTIVELY.)'/  )
0008             1001 FORMAT (/' LABORATORY CODE NO.:'
                     1,I3//' RAT SAMP LAB MEAN',5X,'VARIANCE    STAND.DEV. RSD(%) ',
                     25X,'VARIANCE    SD',9X,'RSD(%)',6X,'VARIANCE',4X,'SD',9X,'RSD(%)'
                     3/23X,'LAB MEAN    LAB MEAN    LAB MEAN',4X,'RUN',9X,'RUN',8X,
                     4 'RUN',9X,'SCAN',8X,'SCAN',7X,'SCAN')
0009             1002 FORMAT (I3,2X,A2,2X, D10.4,4X,D10.4,2X,D9.3,2X,D9.3,3X,D10.4,
                     12X, D9.3,2X,D9.3,3X,D10.4,2X,D9.3,2X,D9.3)
0010             1003 FORMAT (///)
0011             1004 FORMAT (' SQA=',D11.5,' SQR=',D11.5,' NVAL=',I3,' IFIL= ',I3)
```

```
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 0012            1005 FORMAT (' ALARM     ALARM     ALARM     ')
 0013            1006 FORMAT (' THE RUN COMPONENT OF THE VARIANCE IS NEGATIVE,IT IS PUT
                     1= -5.')
 0014            1007 FORMAT (' THE SCAN COMPONENT OF THE VARIANCE IS NEGATIVE,IT IS PUT
                     1=-4.')
                C
                C     PRINTING OF THE TITEL OF THE PAGE
 0015                 PRINT 1000
                C     PRINTING OF THE LAB AND TITEL CF THE LIST
 0016                 PRINT 1001,ILAB(M)
                C
                C     THE DO LOOPS ARE ARRANGED IN THE ORDER WANTED FOR THE OUTPUT LIST
                C     THE NCRMAL ORDER OF ISOTOPIC RATIOS IS: 83,92,02,38,48,58,68,89,09,19,29
                C     THE ORDER WISHED HERE IS:               83,38,48,58,68,92,02,89,09,19,29
                C
 C017                 L2=1
 0018                 M2=M
                C     DO-LOOP OVER THE ISOTOPIC RATIOS
 0019                 DO 999 L=1,13
 0020                 LL2=L
 0021                 IF(L.EQ.2) GO TO 999
 0022                 IF(L.EQ.3)  GO TO 999
 0023                 IF(L.EQ.8) LL2=2
 0024                 IF(L.EQ.9) LL2=3
 0025                 IF(L.GT.9) LL2=L-2
                C     DO-LCOP OVER THE SAMPLE TYPES
 0026                 DO 998  K2=1,8
                C     TRICK FCR ORGANISATION OF THE OUTPUT LIST
 0027                 IF(MEANV(M ,K2,L2,LL2).LT.-2.) GO TC 998
 0028                 IFIL=3
 0029                 IFILI=3
 0030                 SUM=0.
                C     CALCULATION OF THE LAB MEAN
 0031                 DO 5 LA=1,IFIL
                C     TEST,IF A RUN IS MISSING
 0032                 IF(MVAL(   K2,LA,LL2).EQ.0)  IFILI=IFILI-1
 0033               5 SUM=SUM+MEANV(M ,K2,LA,LL2)
 0034                 IFILIV(M,K2,LL2) = IFILI
 0035              84 IF(IFILI.EQ.0)  GO TO 86
 0036                 MEANA=SUM/IFILI
 0037                 GO TO 87
 0038              86 MEANA=0.
 0039              87 MEAN2 (M     ,K2,LL2)=MEANA
 CC4C                 SCL=0.
 0041                 SG2=0.
 0042                 SDG=0.
 0043                 RSDG=0.
                C
```

```
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 0044                   SQA=0.
 0045                   SQR=0.
 0046                   SIGA2=0.
 0047                   SDA=0.
 0048                   RSDA=0.
              C
 0049                   SIGE2=0.
 0050                   SDE=0.
 0051                   RSDE=0.
 0052                   RSDCON=0.
 0053                   DIFF=0.
 0054                88 NVAL=MVAL(    K2,L2,LL2)
 0055                   IF(NVAL.LT.2)  GO TO 14
              C         IF THERE ARE LESS THAN 2 MEASUREMENTS IN THE FIRST RUN,
              C         NO ANALYSIS OF VARIANCES CAN BE MADE
              C
              C
              C         CALCULATION OF THE VARIANCE
 0056                   SUMA=0.
 0057                   DO 7 LA=1,IFIL
 0058                   NVAL=MVAL(K2,LA,LL2)
 0059                   IF(NVAL.LT.2)  GO TO  7
 0060                   SUMA=SUMA+(MEANV(M ,K2,LA,LL2)-MEANA)**2
 0061                 7 CONTINUE
 0062                   SQL=SUMA
 0063                   IF(IFILI.LE.1)  GO TO 89
 0064                   SG2=SQL/(IFILI*(IFILI-1))
 0065                   SDG=DSQRT(SG2)
 0066                   IF(MEANA.LE.0.)  GO TO 89
 0067                   RSDG=(SDG/MEANA)*100.
 0068                89 CONTINUE
              C
              C         THE FOLLOWING CALCULATION IS O.K. FOR THE NORMAL CASE WITH 8 SCANS PER RUN
 0069                   SQA=8.*SQL
 0070                   DO 9  LA=1,IFIL
 0071                 9 SQR=SQR+SQIV(    K2,LA,LL2)
              C         PRINT 1004,SQA,SQR,NVAL,IFIL
 0072                   NVAL=8
 0073                   IF(IFILI.LE.1)  GO TO 15
 0074                   SIGA2=(1./NVAL)*((SQA/(IFILI-1))-(SQR/(IFILI*(NVAL-1))))
 0075                   GO TO 18
 0076                15 SIGA2=-5.
 0077                18 IF (SIGA2.LT.0.00000000)  GO TO 10
 0078                   SDA=DSQRT(SIGA2)
 0079                   IF(MEANA. LT.0.)  GO TO 11
 0080                   RSDA=(SDA/MEANA)*100.
 0081                   GO TO 12
              C  10 PRINT 1006
```

```
   10 CONTINUE
      SCA =-5.
   11 RSDA = -5.
   12 NUM=IFILI*NVAL
      IF((NUM-IFILI).LE.0)  GO TO 16
      SIGE2=SQR/(NUM-IFILI)
      GO TO 19
   16 SIGE2=-4.
   19 IF(SIGE2.LT.0.00000000)  GO TO 20
      SDE=DSQRT(SIGE2)
      IF(MEANA. LE.0.)  GO TO 13
      RSDE=(SDE/MEANA)*100.
      IF(IFILI.EQ.0)  GO TO 17
      IF(NUM.EQ.0)  GO TO 17
      IF((SIGA2/IFILI +SIGE2/NUM).LE.0.)  GO TO 17
      RSDCON=(100./MEANA)*DSQRT(SIGA2/IFILI +SIGE2/NUM)
C     THIS NUMBER IS CALCULATED FOR CONTROL
      DIFF=RSDG-RSDCON
      GO TO 14
   20 PRINT 1007
      SDE=-4.
   13 RSDE=-4.
   17 RSDCON=-4.
      DIFF=-4.
C     PRINTING OF THE RESULTS
   14 IF(L.EQ.8) PRINT 1003
C     EXTRA BLOCK FOR PLUTONIUM RESULTS
      PRINT 1002,IR(LL2),TYP(K2),MEANA,SG2,SDG,RSDG,SIGA2,SDA,RSD
     1A,SIGE2,SDE,RSDE
      SG2V  (M2,K2,LL2)=SG2
      SDGV  (M2,K2,LL2)=SDG
      RSDGV (M2,K2,LL2)=RSDG
      RSDCOV(M2,K2,LL2)=RSDCON
      SIGA2V(M2,K2,LL2)=SIGA2
      SDAV  (M2,K2,LL2)=SDA
      RSDAV (M2,K2,LL2)=RSDA
      SIGE2V(M2,K2,LL2)=SIGE2
      SDEV  (M2,K2,LL2)=SDE
      RSDEV (M2,K2,LL2)=RSDE
      DIFV  (M2,K2,LL2)=DIFF
  998 CONTINUE
  999 CONTINUE
      RETURN
      END
```

```
FORTRAN IV G1  RELEASE 2.0              ALPHA               DATE = 75015           13/37/58

0001                    SUBROUTINE ALPHA (M3,WALPHA,NALPHA,MEAN3,ILAB,TYP)
               C
               C
               C
               C
               C
               C
               C        THIS SUBROUTINE READS THE RESULTS OF ALPHA SPECTROMETRY
               C        NORMAL RESULTS BEGIN WITH A CARD  WITH +7. IN THE FIRST 3 COLUMNS.
               C        IF NO RESULTS ARE AVAILABLE,A CARD WITH +8. IN COLUMNS 1-3 IS READ
               C        THE VECTOR VALPHA HAS THREE INCICES.
               C        THE FIRST(M3)STANDS FOR THE LAB
               C        THE SECCND (K3) STANDS FOR THE SAMPLE TYPE
               C        THE THIRD (LL3) STANDS FOR THE REPETITION OF MEASUREMENT
               C        THE  INPUT VALUES FOR THIS SUBROUTINE ARE RATIOS OF ALPHA-ACTIVITI
               C        R(238/239+240)
               C
0002                    REAL *8 WALPHA (21,8), MEAN3(21,  8,11), VALPHA(21,8,3)
0003                    REAL*8 XSUM, XMEAN, XVAR, XSIG, RXSD,RSD,XSD
0004                    DIMENSION ILAB(21),TYP(8)
               C
0005             1000 FORMAT (F10.5)
0006             1001 FORMAT (10X,3 F10.5, 40X)
0007             1002 FORMAT (////' RESULTS OF SUBROUTINE ALPHA',/,'OLABORATORY CODE NO.
                     1: '    ,I2//' SAMPLE   ALPHA-ACTIVITY   VARIANCE      SD          R
                     2SD(%)          RSD(%)        RATIO 89'/'             MEAN VALUE
                     3   OF SINGLE MEASUREMENT                 CF MEAN')
0008             1003 FORMAT (A6,D15.5,D17.5,2D12.4,2X,2D12.4)
0009             1004 FORMAT (' FOR SAMPLE ',A2,' NO ALPHA MEASUREMENTS; GIVEN VALUES AR
                     1E DUMMIES')
0010             1005 FORMAT (' FOR SAMPLE ',A2,' ONLY ONE SINGLE ALPHA MEASUREMENT INST
                     1EAD OF THREE RUNS; VARIANCE ETC. ARE SET DUMMY = 9.9')
               C
               C
0011                    READ (5,1000) TEST
0012                    IF (TEST.LT. 7.99)  GO TO 10
0013                    NALPHA = 0
0014                    RETURN
0015                 10 READ (5,1001) ((VALPHA(M3,K3,N3) ,N3=1,3),K3=3,8)
               C        PRINT1001, ((VALPHA (M3,K3,N3),N3=1,3),K3=3,8)
0016                    NALPHA = 1
               C        PRINTING OF THE TITLE OF THE TABLE
0017                    PRINT 1002,ILAB(M3)
0018                    DO 50   KI = 3,8
0019                    XSUM = 0.
0020                    NA=3
0021                    DO 12 NI = 1,3
0022                    IF (VALPHA(M3,KI,NI).GT.9.)  GO TO 11
```

```
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 0023                  XSUM = XSUM + VALPHA(M3,KI,NI)
 0024                  GO TO 12
 0025               11 NA=NI-1
 0026                  GO TO 13
 0027               12 CONTINUE
 0028               13 IF (NA.GE.1)  GO TO 14
 0029                  PRINT 1004,TYP(KI)
 0030                  XMEAN =9.9
 0031                  GO TO 15
 0032               14 XMEAN = XSUM/NA
 0033               15 XVAR = 0.
 0034                  IF(NA.LT.1) GO TO 19
 0035                  IF (NA.EQ.1)  GO TO 17
 0036                  DO 16 NI = 1,NA
 0037               16 XVAR = XVAR + (XMEAN - VALPHA(M3,KI,NI))**2
 0038                  XSIG = XVAR/(NA-1)
 0039                  XSD = DSQRT (XSIG)
 0040                  RXSD = (XSD/XMEAN)*100.
                C      RSD OF THE MEAN VALUE
 0041                  RSD=RXSD/SQRT(FLOAT(NA))
 0042                  GO TO 18
 0043               17 PRINT 1005,TYP(KI)
 0044               19 XSIG=9.9
 0045                  XSD=9.9
 0046                  RXSD=9.9
 0047                  RSD=9.9
 0048               18 WALPHA (M3,KI ) = 87.7*XMEAN*((1./2.44D+04) + (MEAN3(M3  ,KI,9)/6.
                      158D+03))
 0049                  PRINT 1003,TYP(KI), XMEAN, XSIG, XSD, RXSD,RSD, WALPHA(M3,KI)
 0050               50 CONTINUE
 0051                  RETURN
 0052                  END
```

```
FORTRAN IV G1  RELEASE 2.0              LAB3              DATE = 75015         13/37/58

0001                 SUBROUTINE LAB3 (MEAN3,M3,IR,TYP,ILAB,NALPHA,WALPHA)
               C
               C
               C
               C
               C
               C
               C      THIS SUBROUTINE CALCULATES THE ISOTOPIC COMPOSITIONS  IN ATOM
               C      PERCENTAGES AND WEIGHT PERCENTAGES FOR EACH SAMPLE.
               C      THE RESULTS OF ALPHA SPECTROMETRY HAVE TO BE TREATED SEPARATELY.
               C      INPUT VALUES ARE THE MEAN VALUES OVER SCANS AND RUNS = LAB MEAN VA
               C      THEY ARE GIVEN AS
               C      MEAN3(M3,J3,K3,LL3), WHERE
               C      M3 - LAB
               C      J3 - STANDARD EXPERIMENT,=1
               C      K3 - SAMPLE TYPE
               C      LL3- ISOTOPIC RATIO NAME
               C      THE ORDER FOR THE VECTORS OF SAMPLE TYPES AND ISOTOPIC RATIOS
               C      SAMPLE TYPE: US,PS,AU,BU,RU,AS,BS,RS
               C      RATIO : 83,92,02,38,48,58,68,89,09,19,29
               C
0002                  REAL*8 MEAN3(21,  8,11),UR,ATU(8,8)/64*0./,SATU,PR,ATP(8,11)/88*0.
                     1/,SATP, PRAL, SATPAL, GPALS, SGPAL
0003                  REAL * 8 GATU(8,8)/64*0./,GUS,GU(8,8)/64*0./,SGU,GPS,GATP(8,11)/88
                     1*0./,GP(8,11)/88*0./,SGP, ATAL(8,11)/88*0./,GPALT(8,11)/88*0./
0004                  REAL*8 WALPHA (21,8)          ,GPAL(8,11)/88*0./
0005                  DIMENSION  IR(11),TYP( 8),ILAB(21)
               C
               C
0006             1000 FORMAT (' RESULTS OF PROGRAM LAB3 FOR THE STANDARD EXPERIMENT'///'
                     1 LABORATORY CODE NO.:',I3//)
0007             1001 FORMAT(' ISOTOPIC COMPOSITION IN ATOM PERCENTAGES'//' URANIUM
                     1ATU233        ATU234        ATU235        ATU236        ATU238'/' SAMPLE')
0008             1002 FORMAT (A6,5X,6(D11.5,1X))
0009             1003 FORMAT (A6,7X,6(D11.5,1X))
0010             1004 FORMAT('OPLUTONIUM    ATP238        ATP239        ATP240        ATP241
                     1   ATP242    '/' SAMPLE')
0011             1005 FORMAT (A6,7X,6(D11.5,1X))
0012             1006 FORMAT ('1ISOTOPIC COMPOSITION IN ',
                     1          'WEIGHT PERCENTAGES'/'OURANIUM   GU233        GU234
                     1GU235        GU236        GU238       '/' SAMPLE')
0013             1007 FORMAT (' ISOTOPIC COMPOSITION IN ATOM PERCENTAGES,CALCULATED IN P
                     1ROGRAM LAB3'/ ' INCLUDING ALPHA RESULTS'//  ' PLUTONIUM    ',
                     2'ATAL38        ATAL39        ATAL40        ATAL41        ATAL42'/' SAMPLE'
                     3)
0014             1008 FORMAT ('OPLUTONIUM GP238        GP239        GP240        GP241
                     1 GP242     '/' SAMPLE')
0015             1009 FORMAT ( /// ' NO ALPHA RESULTS FOR THE LAB WITH CODE NO.:',I3)
```

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FORTRAN IV G1  RELEASE 2.0              LAB3              DATE = 75015          13/37/58

 0016              1011 FORMAT (///)
 0017              1012 FORMAT(' ISOTOPIC COMPOSITION IN WEIGHT PERCENTAGES,CALCULATED IN
                       1PROGRAM LAB3'/' INCLUDING ALPHA RESULTS' // ' PLUTONIUM GPAL 238
                       2  GPAL 239    GPAL 240    GPAL 241    GPAL 242 '/' SAMPLE')
 0018              1013 FORMAT ('1')
                C
                C
 0019                   PRINT 1013
 0020                   PRINT 1000,ILAB(M3)
 0021                   PRINT 1001
 0022                   J3=1
                C
                C       URANIUM CALCULATIONS
                C       DO LOOP OVER THE SAMPLES
 0023                   DO 30 K3=3,8
 0024                   UR=1.
 0025                   DO 3 LL3=4,7
 0026                 3 UR=UR + MEAN3(M3    ,K3,LL3)
 0027                   DO 5 LL3=4,7
 0028                 5 ATU(K3,LL3)=(MEAN3(M3    ,K3,LL3)/UR)*100.
 0029                   ATU(K3,8) =(1./UR)*100.
                C
                C       CALCULATIONS FOR CONTROL
 0030                   SATU=0.
 0031                   DO 7 LL3=4,8
 0032                 7 SATU=SATU+ATU(K3,LL3)
 0033                   PRINT 1003 ,TYP(K3),(ATU(K3,LL3),LL3=4,8)
 0034                30 CONTINUE
                C
                C
                C       PLUTONIUM CALCULATIONS
 0035                   PRINT 1004
 0036                   DO 60 K3=3,8
 0037                   PR=1.
 0038                   DO 13 LL3=8,11
 0039                13 PR=PR+MEAN3(M3    ,K3,LL3)
 0040                   DO 15 LL3=8,11
 0041                15 ATP(K3,LL3) = (MEAN3(M3    ,K3,LL3)/PR)*100.
 0042                   ATP(K3,7) =(1./PR)*100.
                C       IN THIS VECTOR THE ORDER OF ISOTOPES IS : 7-239,8-238,9-240,10-241
                C
 0043                   SATP=0.
 0044                   DO 17  LL3=7,11
 0045                17 SATP=SATP+ATP(K3,LL3)
 0046                   PRINT 1005,TYP(K3),ATP(K3,8),ATP(K3,7),(ATP(K3,LL3),LL3=9,11)
 0047                60 CONTINUE
                C
                C       CONNECTION WITH ALPHA MEASUREMENTS
```

```
FORTRAN IV G1  RELEASE 2.0              LAB3              DATE = 75015           13/37/58

      C       POSSIBLE INPUT OF OTHER MEASUREMENTS
              CALL ALPHA (M3,WALPHA,NALPHA,MEAN3,ILAB,TYP)
              IF (NALPHA.EQ.0) GO TO 62
              PRINT 1011
              PRINT 1007
              DO 61 K3 = 3,8
              PRAL = WALPHA (M3,K3)+1.
              DO 18 LL3 = 9,11
           18 PRAL = PRAL + MEAN3(M3    ,K3,LL3)
      C       CALCULATION OF ATOM PERCENTAGES WITH INCLUSION OF ALPHA-MEASUREMEN
              ATAL(K3,7) = (1./PRAL)*100.
              ATAL(K3,8) = (WALPHA(M3,K3)/PRAL)*100.
              SATPAL = ATAL(K3,7) + ATAL(K3,8)
              DO 19 LL3 = 9,11
              ATAL(K3,LL3) = (MEAN3(M3    ,K3,LL3)/PRAL)*100.
           19 SATPAL = SATPAL + ATAL (K3,LL3)
              PRINT 1005, TYP(K3),ATAL(K3,8),ATAL(K3,7),(ATAL(K3,LL3),LL3=9,11)
           61 CONTINUE
              GO TO 63
           62 PRINT 1009,ILAB(M3)
      C
      C
      C       NEXT PART : WEIGHT PERCENTAGES
      C       AGAIN URANIUM CALCULATIONS
           63 PRINT 1006
              DO 70 K3=3,8
              GATU(K3,4)=ATU(K3,4) * 233.0395
              GATU(K3,5)=ATU(K3,5) * 234.0409
              GATU(K3,6)=ATU(K3,6) * 235.0439
              GATU(K3,7)=ATU(K3,7) * 236.0457
              GATU(K3,8)=ATU(K3,8) * 238.0508
      C       CALCULATIONS OF WEIGHT PERCENTAGES
      C       AND CONTROL VALUE
              GUS=0.
              DO 21 LL3=4,8
           21 GUS=GUS+GATU(K3,LL3)
              SGU=0.
              DO 23  LL3=4,8
              GU(K3,LL3)=GATU(K3,LL3)/GUS *100.
           23 SGU=SGU+GU(K3,LL3)
              PRINT 1002,TYP(K3),(GU(K3,LL3),LL3=4,8)
           70 CONTINUE
      C
      C
      C       CORRESPONDING PLUTONIUM CALCULATIONS
              PRINT 1008
              DO 80 K3=3,8
              GATP(K3,8)= ATP(K3,8) * 238.0495
```

```
      GATP(K3,7)= ATP(K3,7) * 239.0522
      GATP(K3,9)= ATP(K3,9) * 240.0540
      GATP(K3,10)=ATP(K3,10)* 241.0567
      GATP(K3,11)=ATP(K3,11)* 242.0587
      GPS=0.
      DO 31  LL3=7,11
   31 GPS=GPS+GATP(K3,LL3)
      SGP=0.
      DO 33  LL3=7,11
      GP(K3,LL3)=GATP(K3,LL3)/GPS *100.
   33 SGP=SGP+GP(K3,LL3)
      PRINT 1002 ,TYP(K3),GP(K3,8),GP(K3,7),(GP(K3,LL3),LL3=9,11)
   80 CONTINUE
C
C
C     PARALLEL CALCULATIONS FOR ALPHA RESULTS
      IF(NALPHA.EQ.0)  GO TO 91
      PRINT 1011
      PRINT 1012
      DO 90 K3=3,8
      GPALT(K3,8)=ATAL(K3,8)*238.0495
      GPALT(K3,7)=ATAL(K3,7)*239.0522
      GPALT(K3,9)=ATAL(K3,9)*240.0540
      GPALT(K3,10)=ATAL(K3,10)*241.0567
      GPALT(K3,11)=ATAL(K3,11)*242.0587
      GPALS=0.
      DO 82 LL3=7,11
   82 GPALS = GPALS + GPALT(K3,LL3)
      SGPAL = 0.
      DO 84 LL3 = 7,11
      GPAL(K3,LL3) = (GPALT(K3,LL3)/GPALS)*100.
   84 SGPAL = SGPAL + GPAL(K3,LL3)
      PRINT 1002, TYP (K3),GPAL(K3,8),GPAL(K3,7),(GPAL(K3,LL3),LL3=9,11)
   90 CONTINUE
      GO TO 92
   91 PRINT 1009,ILAB(M3)
   92 CONTINUE
      RETURN
      END
```

```
FORTRAN IV G1  RELEASE 2.0            LAB4              DATE = 75015          13/37/58

0001                   SUBROUTINE LAB4 (MEAN2,M4,MEANV,NALPHA,WALPHA,ILAB,TYP)
                 C
                 C
                 C
                 C
                 C
                 C
                 C     THIS SUBROUTINE CALCULATES THE U AND PU CONCENTRATIONS AND U/PU RA
                 C     EACH LAB.
                 C     THE CALCULATION OF Z IS DESCRIBED IN INTERNAL NOTES NO. 2 AND 3.
                 C
0002                   CCMMCN /DRYA/ KO(21,3,5,2),KOAL(21,3,5,2)
0003                   REAL*8 MEAN2(21,  8,11),R(5,2)/10*0.0/,MEANV(21,8,3,11),C(3,5,2),
                      1CCN(5,2), COM(5,2)/10*0.0/, CSIG(5,2)/10*0.0/, CSD(5,2)/1C*C.0/
0004                   REAL*8 KO        ,KON(5,2),LAURA(5,2),Z(5,2),CRSD(5,2)/10*0.0/,KOM(
                      15,2)/10*0./,WALPHA(21,8),MEA,KOC(4,2,2),CC(4,2,2),CCAL(4,2,2),CKOA
                      2L(4,2,2)
0005                   DIMENSION ILAB(21),TYP(8)
0006                   REAL*8 LAUPA(5,2),D2,D3
0007                   REAL*8 RAL(5,2)/10*0./,CAL(3,5,2),CONAL(5,2),
                      1       COMAL(5,2)/10*0./,CSIGAL(5,2)/10*0./,
                      2       CSDAL(5,2)/10*0./,CRSDAL(5,2)/10*0./,
                      3       KOAL        ,KOMAL(5,2)/10*0./,KONAL(5,2),
                      4       LAUPAL(5,2),PURU(21,5),PURUAL(21,5)
                 C
0008              1000 FORMAT('1RESULTS OF PROGRAM  LAB4'/' LABORATORY CODE NO.:',I4/////
                      1' URANIUM CONCENTRATIONS'//21X,'U-238 CONCENTRATIONS IN ATOMS/G SO
                      2LUTION'//21X,'SAMPLE A',4X
                      3 ,'SAMPLE B',4X,'SAMPLE R',6X,'SAMPLE A-CALIBRATED    SAMPLE B-CAL
                      4IBRATED')
0009              1001 FORMAT (//21X,'URANIUM CONCENTRATIONS IN MG URANIUM/G SOLUTION'/)
0010              1012 FORMAT (//21X,'PLUTONIUM CONCENTRATIONS IN MICROGRAMS PLUTONIUM/G
                      1SOLUTION'/)
0011              1013 FORMAT(
                      1' C :        1ST RUN    ',3D12.5,D19.5,D23.5/' C :        2ND RUN   '
                      2,3D12.5,D19.5,D23.5/' C :        3RD RUN    ',3D12.5,D19.5,
                      3D23.5)
0012              1002 FORMAT (' CONCENTRATION 1-3   ',3D12.5,D19.5,D23.5,
                      1/' SIGMA',14X,3 D 12.5,/' STANDARD DEVIATION '  ,3 D 12.5,/
                      2' RSD OF MEAN          ' ,3D12.5///)
0013              1003 FORMAT (' NUMBER OF ATOMS 1  ',3D12.5,D19.5,D23.5/' NUMBER CF ATOM
                      1S 2  ',3D12.5,D19.5,D23.5/' NUMBER OF ATOMS 3  ',3D12.5,D19.5,D23.
                      25)
0014              1004 FORMAT (' NO. OF ATOMS  1-3  ',3D12.5,D19.5,D23.5/' RSD OF MEAN',8
                      1X,3D12.5)
0015              1005 FORMAT (///////' PLUTONIUM CONCENTRATIONS'
                      1///21X,'PU-239 CONCENTRATIONS IN ATOMS/G SOLUTION'//
                      2          21X,'SAMPLE A',4X,'SAMPLE B',4X,'SAMPLE R',5X,'SAMPLE A-C
```

```
                    3ALIBRATED    SAMPLE B-CALIBRATED')
0016           1006 FORMAT ( '1'//    ' PLUTCNIUM CCNCENTRATIONS WITH INCLUSICN OF THE
                   1RESULTS OF ALPHA SPECTROMETRY'///21X,'PU-239 CONCENTRATIONS IN ATO
                   2MS/G SOLUTION '//                21X,'SAMPLE A',4X,'SAMPLE B',4X,'S
                   3AMPLE R',5X,'SAMPLE A-CALIBRATED    SAMPLE B-CALIBRATED')
0017           1007 FORMAT (' MEAN2(',2I3,'  4),MEAN2(',2I3,'  4) AND MEA ARE',3F10.6)
0018           1008 FORMAT (' FOR M4,KK4,L4 =',3I5,'  MEANV AND MEAN2 ARE=',2F10.6)
0019           1009 FCRMAT(//////' PU/U-RATIOS'/21X,' SAMPLE A',4X,' SAMPLE B',4X,' SA
                   1MPLE R'/)
0020           1010 FORMAT (' MS-MEASUREMENTS',5X,3D12.5/' ALPHA-MEASUREMENTS',2X,3D12
                   1.5)
0021           1011 FORMAT (' NUMBER OF ATOMS 1  ',3D12.5,D19.5,D23.5/' NUMBER OF ATOM
                   1S 2  ',3D12.5,D19.5,D23.5/' NUMBER OF ATOMS 3  ',3D12.5,D19.5,D23.
                   25)
0022           1014 FORMAT (//' (IF ANY OF THESE RATIOS COULD NOT BE CALCULATED,IT IS
                   1 PUT = 0.)')
0023           1028 FORMAT (' FOR LAB. NO.',I3,' AND SAMPLE',A6,' THE RATIO PU238/239
                   1WAS NOT MEASURED BY ALPHA-SPECTROMETRY.')
0024           1029 FORMAT (' FOR  LAB NO.',I3,' AND SAMPLE ',A6,' THE RATIO PU 238/23
                   19  WAS NCT MEASURED BY MASS SPECTROMETRY.')
0025           1030 FORMAT (          ' MISSING MEASUREMENT RESULTS OR'
                   1,         ' WRONG DENOMINATOR,M4,K4,L4 ARE ',3I4,' MEANV AND MEAN2 A
                   2RE ',2F10.6)
0026           1031 FORMAT (' COM= ',D12.5,' KOM= ',D12.5)
0027           1032 FORMAT (' CSIG= ',D12.5)
               C
               C      K4 INDICATES THE SAMPLE TYPE;ORDER CF SAMPLE TYPES:US,PS,AU,BU,RU,
               C      THE INDICES OF MEAN2 STAND FOR:
               C      FIRST(M4): LAB,
               C      SECOND(K4): SAMPLE TYPE,
               C      THIRD(LL): ISOTOPIC RATIO
               C      THE FIRST INDEX OF R STANDS FOR THE SAMPLE: A, B CR R.
               C      THE SECOND INDEX STANDS FOR U(1) OR PU(2)
               C      ISOTOPIC RATIOS ARE GIVEN IN THE CRDER  83,92,02,38,48,58,68,89,09
0028                  Z(3,1) = 3.1398E-03
0029                  Z(4,1) = 2.9598E-03
0030                  Z(5,1) = 3.5275E-03
               C      DO OVER THE SAMPLES
0031                  DO 10 K4 = 3,5
0032                  R(K4,1) = 233.0395 * MEAN2(M4   ,K4,4)
                     1         + 234.0409 * MEAN2(M4   ,K4,5)
                     2         + 235.0439 * MEAN2(M4   ,K4,6)
                     3         + 236.0457 * MEAN2(M4   ,K4,7)
                     4         + 238.0508
0033                  LAURA(K4,1)=6.022045E+20/R(K4,1)
               C      DO OVER THE RUNS
0034                  COM(K4,1)=0.
0035                  KOM(K4,1)=0.
```

```
0036              CSIG(K4,1)=0.
0037              DO 9 L4 = 1,3
0038              D3=3.
0039              IF(( MEANV(M4,K4+3,L4,4)- MEAN2(M4,3,4)).LE.0.)  GO TO 12
0040              C(L4,K4,1)=Z(K4,1)*R(K4,1)*((1-MEANV(M4,K4+3,L4,4)*MEAN2(M4 ,1,1)
                 1)/(MEANV(M4,K4+3,L4,4)-MEAN2(M4  ,3,4)))
0041              GO TO 13
0042           12 KK4=K4+3
0043              PRINT 1008,M4,KK4,L4,MEANV(M4,KK4,L4,4),MEAN2(M4,3,4)
0044              C( L4,K4,1)=0.
0045              D3=D3-1.
            C     THE VALUES KO DEFINE THE CONCENTRATION OF THE REFERENCE ISOTOPE ,E
            C     IN "NUMBER OF ATOMS PER GRAM OF SOLUTION"
            C     THEIR MEAN VALUE IS KOM.
0046           13 KO (M4,L4,K4,1) = C(L4,K4,1)*LAURA(K4,1)
0047              IF(D3.LE.0.)  GO TO 9
0048              CCM(K4,1)=COM(K4,1)+(1./D3)*C(L4,K4,1)
0049              KOM(K4,1)=KOM(K4,1)+(1./D3)*KO(M4,L4, K4,1)
0050            9 CONTINUE
0051              DO  8 L4=1,3
0052              D2=1./6.
0053              IF(( MEANV(M4,K4+3,L4,4)- MEAN2(M4,3,4)).LE.0.)  D2=0.
0054              CSIG(K4,1)=CSIG(K4,1)+D2 *(C(L4,K4,1)-CCM(K4,1))**2
0055            8 CONTINUE
0056              CSD(K4,1)=DSQRT(CSIG(K4,1))
0057              IF(COM(K4,1).LE.0.)  GO TO 81
0058              CRSD(K4,1)=(CSD(K4,1)/CCM(K4,1))*100.
0059              GO TO 82
0060           81 CRSD(K4,1)=0.
            C     THE CONCENTRATIONS C HAVE THREE INDICES:
            C     THE FIRST(L4) STANDS FOR THE RUN,
            C     THE SECOND (K4) FOR THE SAMPLE,
            C     THE THIRD FOR U(1) OR PU(2).
            C     IN THE FORMULAE FOR C THE RESULTS MEANV FROM LAB1 AND MAIN ARE USE
            C     MEANV HAS 4 INDICES:
            C     THE FIRST (M) STANDS FOR THE LAB
            C     THE SECOND (K) STANDS FOR THE SAMPLE TYPE
            C     THE THIRD (L) STANDS FOR THE RUN
            C     THE FOURTH (LL) STANDS FOR THE ISOTOPIC RATIO
0061           82 MEA=MEAN2(M4,K4+3,4)-MEAN2(M4,K4,4)
0062              IF(MEA.LE.0.)  GO TO 11
0063              CCN(K4,1) = Z(K4,1)*R(K4,1)*((1-MEAN2(M4  ,K4+3,4)*MEAN2(M4,  1,1)
                 1)/MEAN2(M4  ,K4+3,4)-MEAN2(M4  ,K4,4))
0064              KCN(K4,1) = CON(K4,1)*LAURA(K4,1)
            C     IN THE VECTORS C AND CCN THE INDICES K4=3,4,5 STAND FOR THE ORIGIN
            C     SAMPLES A,B,R.
0065              GO TO 10
0066           11 KK4=K4+3
```

```
0067              PRINT 1007,M4,KK4,M4,K4,MEAN2(M4,KK4,4),MEAN2(M4,K4,4),MEA
0068              CON (K4,1) =0.
0069              KON(K4,1)=0.
0070           10 CONTINUE
0071              DO 15 II=1,2
0072              DO 14 I=1,3
           C      THE INDEX I STANDS FOR THE RUN,THE INDEX II FOR THE SAMPLE.
           C      THE THIRD INDEX STANDS FOR U (1) OR PU (2).
0073              KOC(I,II,1)=(KO(M4,I,II+2,1) * 2.786E+18)/KO(M4,I,5,1)
0074              CC(I,II,1)=(KOC(I,II,1) * C(I,II+2,1))/KO(M4,I,II+2,1)
0075           14 CONTINUE
0076              KOC(4,II,1)=(KON(II+2,1) * 2.786E+18)/KON(5,1)
0077              CC(4,II,1)=(KOC(4,II,1) * CON(II+2,1))/ KO(M4,I,II+2,1)
0078           15 CONTINUE
0079              PRINT 1000, ILAB(M4)
0080              PRINT 1003 ,((KO(M4,L4,K4,1),K4=3,5),(KOC(L4,II,1),II=1,2),L4=1,3)
0081              PRINT 1004 ,(KON(K4,1),K4=3,5),(KOC(4,II,1),II=1,2),(CRSD(K4,1),K4
                 1=3,5)
0082              PRINT 1001
0083              PRINT 1013,((C(L4,K4,1),K4=3,5),(CC(L4,II,1),II=1,2),L4=1,3)
0084              PRINT 1002,(CON(K4,1),K4=3,5),(CC(4,II,1),II=1,2),(CSIG(K4,1),K4=
                 13,5),(CSD(K4,1),K4=3,5),(CRSD(K4,1),K4=3,5)
           C
           C
           C
           C
           C      CALCULATION OF PLUTONIUM CONCENTRATIONS
           C      PART A : RESULTS OF MASS SPECTROMETRY
           C      PART B : RESULTS OF ALPHA SPECTROMETRY
           C
           C
           C
           C      PART A :
           C      LAB 23 HAS NOT PERFORMED PU MEASUREMENTS
0085              IF(ILAB(M4).EQ.23) GO TO 100
           C      LAB 22 HAS NOT MEASURED THE PU SPIKE,THE BCMN VALUE IS TAKEN   9.1
0086              IF( ILAB(M4).EQ.22)  MEAN2(M4,2,2)=2.E-04
           C      THE MEASUREMENT RESULTS ON THE PURE PU -SPIKE HAVE TO BE REPLACED
           C      BY THE BCMN RESULTS FOR THE MIXED SPIKE     19.2.74
0087              MEAN2(M4,2,2) = 1.34E-02
           C     ALSO THE Z-VALUES HAVE BEEN CORRECTED 19.2.74
0088              Z(3,2) = 3.6893E-02
0089              Z(4,2) = 3.4778E-02
0090              Z(5,2) = 4.1449E-02
0091              DO 40  K4 = 3,5
0092              KK4=K4+3
0093              IF (MEAN2(M4   ,K4,8).LE.0.000000) GO TO 28
0094              GO TO 29
```

```
0095             28 PRINT 1029 ,ILAB(M4),TYP(K4)
0096             29 R(K4,2) = 238.0495*MEAN2(M4   ,K4,8)+239.0522
                   1+240.0540*MEAN2(M4   ,K4,9)+241.0567*MEAN2(M4   ,K4,10)+242.0587*MEA
                   1N2(M4   ,K4,11)
0097                LAUPA(K4,2) = 6.022045E+17/R(K4,2)
0098                COM(K4,2)=0.
0099                KCM(K4,2)=0.
0100                CSIG(K4,2)=0.
0101                D3=3.
0102                DO 30  L4 = 1,3
           C
           C        SPECIAL CASES OF MISSING MEASUREMENTS OF RATIO 242/239 AND MISSING
           C        THE MISSING RATIO 242/239 FOR SAMPLE RU AS SUCH IS NEGLIGIBLE -
           C        THE RATIO IS VERY LOW FOR THIS SAMPLE
           C        IF(MEANV(M4,KK4,L4,11).LE.0.) GO TO 31
0103                IF(MEANV(M4,KK4,3,11).LE.0.) D3=2.
0104                IF((MEANV(M4,KK4,L4,11)-MEAN2(M4,K4,11)).LE.0.)  GO TO 31
0105                C(L4,K4,2) = Z(K4,2)*R(K4,2)*((1.-MEANV(M4,K4+3,L4,11)*MEAN2(M4 ,2
                   1,2))/(MEANV(M4,K4+3,L4,11)- MEAN2(M4   ,K4,11)))
0106                GO TO 32
0107             31 PRINT 1030,M4,K4,L4,MEANV(M4,KK4,L4,11) ,MEAN2(M4,K4,11)
0108                C(L4,K4,2)=0.
0109             32 KO(M4,L4,K4,2) = C(L4,K4,2)*LAUPA(K4,2)
0110                CCM (K4,2) = COM(K4,2)+(1./D3)*C(L4,K4,2)
0111                KOM(K4,2) = KOM(K4,2)+(1./D3)*KO(M4,L4,K4,2)
           C        IF(ILAB(M4).NE.21) GO TO 30
           C        PRINT 1031,CCM(K4,2),KOM(K4,2)
0112             30 CONTINUE
0113                DO 38 L4=1,3
0114                D2=1./6.
           C        SPECIAL CASE OF MISSING RUN 3 FOR R-SAMPLE
0115                IF(MEANV(M4,KK4,3,11).LE.0.) D2=0.5
0116                IF(MEANV(M4,KK4,L4,11).LE.0.) GO TO 38
0117                CSIG(K4,2) = CSIG(K4,2)+D2 *(C(L4,K4,2)-COM(K4,2))**2
           C        IF(ILAB(M4).NE.21) GO TO 38
           C        PRINT 1032,CSIG(K4,2)
0118             38 CONTINUE
0119                CSD(K4,2) = DSQRT(CSIG(K4,2))
0120                IF (CCM(K4,2).LE.0.)  GO TO 33
0121                CRSD(K4,2) = (CSD(K4,2)/COM(K4,2))*100.
0122                GO TO 34
0123             33 CRSD(K4,2)=0.
0124             34 CON(K4,2) = Z(K4,2)*R(K4,2)*((1.-MEAN2(M4   ,K4+3,11)*MEAN2(M4   ,2,
                   12))/(MEAN2(M4   ,K4+3,11)-MEAN2(M4   ,K4,11)))
0125                KON(K4,2) = CON(K4,2)*LAUPA(K4,2)
0126             40 CONTINUE
0127                PRINT 1005
0128                DO 45 II=1,2
```

```
0129              DO 44 I=1,3
           C      SPECIAL CASE OF MISSING RUN 3 FOR R-SAMPLE
0130              IF(KO(M4,I,5,2).LE.0.) GO TO 43
0131              KOC(I,II,2)=(KO(M4,I,II+2,2) * 2.11E+16) /KO(M4,I,5,2)
0132              CC(I,II,2)=(C(I,II+2,2) * KOC(I,II,2))/KO(M4,I,II+2,2)
0133              GO TO 44
0134           43 KOC(I,II,2)=0.
0135              CC(I,II,2)=0.
0136           44 CONTINUE
0137              KOC(4,II,2)=(KON(II+2,2) * 2.11E+16)/KON(5,2)
0138              CC(4,II,2)=(KOC(4,II,2) * CON(II+2,2))/KO(M4,I,II+2,2)
0139           45 CONTINUE
0140              PRINT 1011,((KO(M4,L4,K4,2),K4=3,5),(KOC(L4,II,2),II=1,2),L4=1,3)
0141              PRINT 1004,(KON(K4,2),K4=3,5),(KOC(4,II,2),II=1,2),(CRSD(K4,2),K4
                 1=3,5)
0142              PRINT 1012
0143              PRINT 1013,((C(L4,K4,2),K4=3,5),(CC(L4,II,2),II=1,2),L4=1,3)
0144              PRINT 1002,(CON(K4,2),K4=3,5),(CC(4,II,2),II=1,2),(CSIG(K4,2),K4=
                 13,5),(CSD(K4,2),K4=3,5),(CRSD(K4,2),K4=3,5)
0145           60 CONTINUE
           C
           C      PART B:
           C
0146              IF ( NALPHA.EQ.0) GO TO 91
           C
           C
0147              DO 70 K4=3,5
0148              RAL(K4,2)=238.0495*WALPHA(M4,K4)
                 1            +239.0522
                 2            +240.0540*MEAN2(M4   ,K4,9)
                 3            +241.0567*MEAN2(M4   ,K4,10)
                 4            +242.0587*MEAN2(M4   ,K4,11)
0149              LAUPAL(K4,2)=6.022045E+17/RAL(K4,2)
0150              COMAL(K4,2)=0.
0151              KOMAL(K4,2)=0.
0152              CSIGAL(K4,2)=0.
0153              D3=3.
0154              KK4=K4+3
0155              DO 65 L4=1,3
0156              IF(MEANV(M4,KK4,3,11).LE.0.) D3=2.
0157              IF ((MEANV(M4,KK4,L4,11)- MEAN2(M4,K4,11)).LE.0.)  GO TO 61
0158              CAL(L4,K4,2) = Z(K4,2)*RAL(K4,2)*((1.-MEANV(M4,K4+3,L4,11)*MEAN2(M
                 14,2,2))/(MEANV(M4,K4+3,L4,11)-MEAN2(M4   ,K4,11)))
0159              GO TO 62
0160           61 PRINT 1030,M4,K4,L4,MEANV(M4,KK4,L4,11), MEAN2(M4,K4,11)
0161              CAL(L4,K4,2) =0.
0162           62 KOAL(M4,L4,K4,2)=CAL(L4,K4,2)*LAUPAL(K4,2)
0163              COMAL(K4,2)=COMAL(K4,2)+(1./D3)*CAL(L4,K4,2)
```

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                 KCMAL(K4,2)=KOMAL(K4,2)+(1./D3)*KOAL(M4,L4,K4,2)
              65 CONTINUE
                 DO 68 L4=1,3
                 D2=1./6.
                 IF(MEANV(M4,KK4,3,11).LE.0.) D2=0.5
                 CSIGAL(K4,2)=CSIGAL(K4,2)+D2 *(CAL(L4,K4,2)-COMAL(K4,2))**2
              68 CONTINUE
                 CSDAL(K4,2)=DSQRT(CSIGAL(K4,2))
                 IF (COMAL(K4,2).LE.0.)  GO TO 66
                 CRSDAL(K4,2)=(CSDAL(K4,2)/COMAL(K4,2))*100.
                 GO TO 67
              66 CRSDAL(K4,2)=0.
              67 CONAL(K4,2)= Z(K4,2)*RAL(K4,2)*((1.-MEAN2(M4,K4+3,11)*MEAN2(M4,2,2
                1))/(MEAN2(M4,K4+3,11)-MEAN2(M4,K4,11)))
                 KONAL(K4,2)=CONAL(K4,2)*LAUPAL(K4,2)
              70 CONTINUE
                 GO TO 71
              91 PRINT 1028,ILAB(M4),TYP(3)
           C
              71 IF(NALPHA.EQ.0) GO TO 90
                 PRINT 1006
                 DO 75 II=1,2
                 DO 74 I=1,3
                 IF(KOAL(M4,I,5,2).LE.0.) GO TO 73
                 CKOAL(I,II,2)=(KOAL(M4,I,II+2,2) * 2.11E+16)/KOAL(M4,I,5,2)
                 CCAL(I,II,2)=(CKOAL(I,II,2) * CAL(I,II+2,2))/KOAL(M4,I,II+2,2)
                 GO TO 74
              73 CKOAL(I,II,2)=0.
                 CCAL(I,II,2)=0.
              74 CONTINUE
                 CKOAL(4,II,2)=(KCNAL(II+2,2) * 2.11E+16)/KONAL(5,2)
                 CCAL(4,II,2)=(CKOAL(4,II,2) * CONAL(II+2,2))/KOAL(M4,I,II+2,2)
              75 CONTINUE
                 PRINT 1011,((KOAL(M4,L4,K4,2),K4=3,5),(CKOAL(L4,II,2),II=1,2),L4=1
                1,3)
                 PRINT 1004,(KCNAL(K4,2),K4=3,5),(CKOAL(4,II,2),II=1,2),(CRSDAL(K4,
                12),K4=3,5)
                 PRINT 1012
                 PRINT 1013,((CAL(L4,K4,2),K4=3,5),(CCAL(L4,II,2),II=1,2),L4=1,3)
                 PRINT 1002,(CONAL(K4,2),K4=3,5),(CCAL(4,II,2),II=1,2),(CSIGAL (K4,
                12),K4=3,5),(CSDAL(K4,2),K4=3,5),(CRSDAL( K4,2),K4=3,5)
              90 CONTINUE
           C
           C
           C     CALCULATION OF THE PU/U RATIO
              92 DO 94  K4=3,5
                 IF(CON(K4,1).LE.0.)  GO TO 95
                 PURU(M4,K4)= CON(K4,2)/CON(K4,1)
```

```
          GO TO S6
       95 PURU(M4,K4) =0.
       96 IF(CCN(K4,1).LE.0.)  GO TO 93
          IF(NALPHA.EQ.0)  GO TC 93
          PURUAL(M4,K4)=CONAL(K4,2)/CON(K4,1)
          GO TO 94
       93 PURUAL(M4,K4) =0.
       94 CCNTINUE
          PRINT 1C09
          PRINT 1010,(PURU(M4,K4),K4=3,5),(PURUAL(M4,K4),K4=3,5)
          PRINT 1014
      100 CONTINUE
          RETURN
          END
```

```
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0001                SUBROUTINE LAB5 (NLAB,MVALV,IFILIV,MEANV,SUMV,IR,TYP,ILAB)
              C
              C
              C
              C
              C
              C
0002                DIMENSION IR(11),TYP(8),ILAB(21)
0003                INTEGER * 2 MM(8,11)/88*0/,SS(8,11)/88*0/,MVALV(21,8,3,11),IFILIV(
                   121,8,11),NP1(21)/21*0/
0004                REAL * 8 D,F,Y2P,Y3P,MEANV (21,8,3,11),                     MMEAN,  E,
                   1G,H,IH,SUMV(21,8,3,11),Y1P(3) ,EE
0005                REAL*8 K11,K12,K22,SQA,SQB,SQR,MQA,MQB,MQR,SDE,RSDE,SIGB,SDB,RSDB,
                   1SIGA,SDA,RSCA,R1,R2,R3,R4,R5,R6,R7
              C
0006           1000 FORMAT ('1RESULTS OF SUBROUTINE LAB5'/' ANALYSIS OF VARIANCES IN
                   1THREE STEPS: INTERLAB,RUN AND SCAN COMPONENTS'/ I5,' LABS ARE TAKE
                   2N INTO ACCOUNT AT MAXIMUM '//' (IF THE RUN OR SCAN COMPONENT OF AN
                   3Y VARIANCE IS NEGATIVE AND THEREFORE CONSIDERED AS NOT SIGNIFICANT
                   4,'/' SD AND RSD ARE PUT = 0. CORRESPONDINGLY.)')
0007           1001 FORMAT (' SAMP RAT LABS RUNS SCANS MMEAN      SIG-SCAN  SD-SCAN   R
                   1SD-SCAN  SIG-RUN    SD-RUN    RSD-RUN   SIG-LABS  SD-LABS   RSD-LAB
                   3S '/)
0008           1002 FORMAT (2X,A2,3X,I2,1X,I3,I4,I7,1X,1P10D10.3)
0009           1003 FORMAT (' MQR IS NEGATIVE, MQR,SQR,NN AND SS(K,LL) ARE:',2D15.6,
                   1 2I5)
0010           1004 FORMAT (' SIGB IS NEGATIVE, SIGB, MQB, SQR AND K22 ARE: ',4D15.6)
0011           1005 FORMAT (' SIGA IS NEGATIVE, SIGA,K11,MQA, K12, K22, MQB, AND MQR
                   1 ARE :'/' ',7D15.4)
0012           1006 FORMAT (///)
0013           1007 FORMAT (' NP1,Y2P,D,E,G,H,NN  ARE:',I4,5D15.4,I5)
0014           1008 FORMAT (' Y1P(',I2,')=',F10.2,' NVALVV=N(I,J)**2= ',I3)
0015           1009 FORMAT (' F,Y3P,IH =',3D15.4,' MM(K,LL) AND SS(K,LL) ARE',2I4)
0016           1010 FORMAT (' COMBINATIONS OF MM=',I3,' ,SS=',I3,' AND  NN=',I3,' ARE
                   1ZERO')
0017           1011 FORMAT (///' NN=',I5)
0018           1012 FORMAT (' IH=',D10.4)
0019           1013 FORMAT (' MMEAN=',D10.4)
0020           1016 FORMAT (' MEAN2=',D10.4)
0021           1019 FORMAT (' M,K,L,LL AND SUMV(M,K,L,LL) ARE:',4I4,D15.4)
0022           1020 FORMAT (' IN DO 60  M,K,L,LL,NVAL AND MEANV ARE:',5I5,D15.4)
0023           1021 FORMAT (' K,LL AND SS ARE:',3I5)
0024           1023 FORMAT (' NP1(M=',I2,') IS',I5,' Y2P IS ',D15.4)
0025           1024 FORMAT(' FOR LAB',I3,' SAMPLE ',A3,' AND RATIO',I3,' IFILIV= ',I3)
0026           1025 FORMAT(' FOR LAB',I3,' SAMPLE ',A3,' RATIO',I3,' AND RUN',I2,' THE
                   1 NO. OF SCANS IS',I2)
              C
              C
```

```
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                C      MM(K,LL) IS THE NUMBER OF LABS,FOR WHICH STANDARD EXPERIMENT RESUL
                C      AVAILABLE.
                C      SS(K,LL) IS THE NUMBER OF RUNS IN ALL LABS,IN WHICH THE ISOTOPIC R
                C      LL OF THE SAMPLE K HAS BEEN MEASURED.
                C      NN IS THE OVERALL NUMBER OF MEASUREMENTS
                C
                C
 0027                  PRINT 1000,NLAB
 0028                  PRINT 1006
 0029                  PRINT 1001
                C      DO OVER THE SAMPLES  US,PS,AU,BU,RU,AS,BS,RS
 0030                  DO 90 K=1,8
                C      DO OVER THE ISOTOPIC RATIOS
 0031                  DO 80 LL=1,11
 0032                  MM(K,LL) =0
 0033                  SS(K,LL) =0
 0034                  LLMAX=11
 0035                  LLMIN=1
                C      THE SEQUENCE OF ISOTOPIC RATIOS IS 83,92,02, 38,48,58,68, 89,09,19,29
                C      FOR THE US SAMPLE ONLY ONE ISOTOPIC RATIO AND FOR THE PS SAMPLE ON
                C      ISOTOPIC RATIOS ARE MEASURED
 0036                  IF(K.EQ.1)  GO TO 10
 0037                  IF(K.EQ.2)  GO TO 11
 0038                  GO TO 12
 0039               10 LLMAX=1
 0040                  GO TO 15
 0041               11 LLMIN=2
 0042                  LLMAX=3
 0043                  GO TO 15
 0044               12 LLMIN=4
 0045               15 CONTINUE
 0046                  IF (LL.LT.LLMIN) GO TO 80
 0047                  IF (LL.GT.LLMAX) GO TO 80
 0048                  D=0.
 0049                  E=0.
 0050                  F=0.
 0051                  G=0.
 0052                  H=0.
 0053                  IH=0.
 0054                  MMEAN =5.5
 0055                  K11=5.5
 0056                  K12=5.5
 0057                  K22=5.5
 0058                  SQA=5.5
 0059                  MQA=5.5
 0060                  MQB=5.5
 0061                  MQR=-5.5
                C      DO OVER THE LABS
```

```
                  NN=0
                  Y3P=0.
                  DO 70 M=1,NLAB
C                 SOME SPECIAL LABS SHALL BE OMITTED
                  IF(K.EQ.1) GO TO 50
                  IF(K.EQ.2) GO TO 51
                  IF (K.EQ.3) GO TO 52
                  IF (K.EQ.4) GO TO 53
                  IF(K.EQ.5) GO TO 54
                  IF(K.EQ.6) GO TO 55
                  IF(K.EQ.7) GO TO 56
                  IF(K.EQ.8) GO TO 57
                  GO TO 58
C                 UNSPIKED SAMPLES
               50 IF(LL.NE.1) GO TO 58
                  IF(ILAB(M).EQ.5) GO TO 70
                  IF(ILAB(M).EQ.8) GO TO 70
                  IF(ILAB(M).EQ.20) GO TO 70
                  IF(ILAB(M).EQ.21) GO TO 70
                  GO TO 58
               51 IF(LL.NE.2) GO TO 41
                  IF(ILAB(M).EQ.16) GO TO 70
                  IF(ILAB(M).EQ.21) GO TO 70
                  GO TO 58
               41 IF(LL.NE.3) GO TO 58
                  IF(ILAB(M).EQ.8) GO TO 70
                  IF(ILAB(M).EQ.16) GO TO 70
                  IF(ILAB(M).EQ.21) GO TO 70
                  GO TO 58
               52 IF (LL.NE.7) GO TO 522
                  IF(ILAB(M).EQ.4) GO TO 70
                  GO TO 58
              522 IF(LL.NE.8) GO TO 42
                  IF(ILAB(M). EQ.19) GO TO 70
                  GO TO 58
               42 IF(LL.NE.9) GO TO 32
                  IF(ILAB(M).EQ.4) GO TO 70
                  IF(ILAB(M).EQ.5) GO TO 70
                  GO TO 58
               32 IF(LL.NE.10) GO TO 22
                  IF(ILAB(M).EQ.2) GO TO 70
                  GO TO 58
               22 IF(LL.NE.11)  GO TO 58
                  IF(ILAB(M).EQ.8) GO TO 70
                  GO TO 58
               53 IF (LL.NE.7) GO TO 433
                  IF(ILAB(M) .EQ.18) GO TO 70
                  GO TO 58
```

```
          433 IF(LL.NE.8) GO TO 43
              IF(ILAB(M).EQ.19) GO TO 70
              GO TO 58
           43 IF(LL.NE.10) GO TO 33
              IF(ILAB(M).EQ.2) GO TO 70
              GO TO 58
           33 IF(LL.NE.11) GO TO 58
      C       ONE VERSION WITH AND ONE WITHOUT INCLUSION OF LAB NO. 20
              IF(ILAB(M).EQ.20) GO TO 70
              GO TO 58
           54 IF(LL.NE.5) GO TO 44
              IF(ILAB(M).EQ.5) GO TO 70
              GO TO 58
           44 IF(LL.NE.6) GO TO 34
              IF(ILAB(M).EQ.21) GO TO 70
              GO TO 58
           34 IF(LL.NE.9) GO TO 24
              IF(ILAB(M).EQ.4) GO TO 70
              IF(ILAB(M).EQ.5) GO TO 70
              IF(ILAB(M).EQ.8) GO TO 70
              IF(ILAB(M).EQ.21) GO TO 70
              GO TO 58
           24 IF(LL.NE.10) GO TO 14
              IF(ILAB(M).EQ.2) GO TO 70
              IF(ILAB(M).EQ.8) GO TO 70
              IF(ILAB(M).EQ.21) GO TO 70
              GO TO 58
           14 IF(LL.NE.11) GO TO 58
              IF(ILAB(M).EQ.6) GO TO 70
              IF(ILAB(M).EQ.8) GO TO 70
              GO TO 58
      C
      C
      C       SPIKED SAMPLES
           55 IF(LL.NE.7) GO TO 45
              IF(ILAB(M).EQ.20) GO TO 70
              GO TO 58
           45 IF(LL.NE.8) GO TO 35
              IF(ILAB(M).EQ.19) GO TO 70
              GO TO 58
           35 IF(LL.NE.10) GO TO 25
              IF(ILAB(M).EQ.2) GO TO 70
              GO TO 58
           25 IF(LL.NE.11) GO TO 58
              IF(ILAB(M).EQ.4) GO TO 70
              IF(ILAB(M).EQ.8) GO TO 70
              GO TO 58
      C
```

```
   56 IF(LL.NE.7) GO TO 46
      IF(ILAB(M).EQ.4) GO TC 70
      IF(ILAB(M).EQ.18) GO TO 70
      IF(ILAB(M).EQ.20) GO TO 70
      GO TO 58
   46 IF(LL.NE.8) GO TO 36
      IF(ILAB(M).EQ.19) GO TO 70
      GO TO 58
   36 IF(LL.NE.10) GO TO 26
      IF(ILAB(M).EQ.2) GO TO 70
      GO TO 58
   26 IF(LL.NE.11) GO TO 58
      IF(ILAB(M).EQ.4) GO TO 70
      IF(ILAB(M).EQ.6) GO TO 70
      IF(ILAB(M).EQ.8) GO TO 70
      IF(ILAB(M).EQ.21) GO TO 70
      GO TO 58
C
   57 IF(LL.NE.5) GO TO 47
      IF(ILAB(M).EQ.7) GO TO 70
      GO TO 58
   47 IF(LL.NE.6) GO TO 37
      IF(ILAB(M).EQ.21) GO TO 70
      GO TO 58
   37 IF(LL.NE.9) GO TO 27
      IF(ILAB(M).EQ.8) GO TO 70
      IF(ILAB(M).EQ.21) GO TO 70
      GO TO 58
   27 IF(LL.NE.10) GO TO 17
      IF(ILAB(M).EQ.2) GO TO 70
      IF(ILAB(M).EQ.8) GO TO 70
      IF(ILAB(M).EQ.20) GO TO 70
      IF(ILAB(M).EQ.21) GO TO 70
      GO TO 58
   17 IF(LL.NE.11) GO TO 58
      IF(ILAB(M).EQ.4) GO TO 70
      IF(ILAB(M).EQ.6) GO TO 70
      IF(ILAB(M).EQ.8) GO TO 70
      IF(ILAB(M).EQ.21) GO TO 70
C
C
C     END OF THE SELECTION FOR OMISSION OF SINGLE LABS
   58 EE=0.
      NP1(M) =0
      IFILV=IFILIV(M,K,LL)
C     PRINT 1024,ILAB(M),TYP(K),IR(LL),IFILV
C
C     CHECK OF THE NUMBER OF RUNS
```

```
             IF(IFILV.LE.0) GO TO 701
      C      DO OVER THE RUNS
             Y2P=0.
             DO 59  L=1,3
          59 Y1P(L)=0.
             DO 60 L=1,IFILV
             NVALV=MVALV(M,K,L,LL)
             NVALVV=NVALV**2
      C      PRINT 1020,M,K,L,LL,NVALV,MEANV(M,K,L,LL)
      C
      C      CHECK OF THE NUMBER OF SCANS
             IF(NVALV.LE.1)  GO TO 601
             IF (L.GT.1)  GO TO 19
             MM(K,LL)=MM(K,LL) +1
          19 SS(K,LL)= SS(K,LL) +1
      C      PRINT 1021,K,LL,SS(K,LL)
             Y1P(L)=Y1P(L) + NVALV*MEANV(M,K,L,LL)
      C      PRINT 1008 ,L,Y1P(L),NVALVV
             NP1(M)=NP1(M) + MVALV(M,K,L,LL)
             Y2P=Y2P + Y1P(L)
      C      PRINT 1023,M,NP1(M),Y2P
             D=D+NVALVV
             EE= EE+ NVALVV
          62 G=G+SUMV(M,K,L,LL)
             H=H +(Y1P(L)**2)/NVALV
             GO TO 60
      C 601 PRINT 1025,ILAB(M),TYP(K),IR(LL),L,NVALV
         601 CONTINUE
          60 CONTINUE
             NN=NN + NP1(M)
             IF  (NP1(M).LE.0)  GO TO 69
             E=E + EE/NP1(M)
             F=F+NP1(M) **2
             IH=IH + (Y2P**2)/NP1(M)
          69 Y3P=Y3P + Y2P
      C      PRINT 1007,NP1(M),     Y2P,D,E,G,H ,NN
      C      PRINT 1009,F,Y3P,IH,MM(K,LL),SS(K,LL)
             GO TO 70
      C 701 PRINT 1024,ILAB(M),TYP(K),IR(LL),IFILV
         701 CONTINUE
          70 CONTINUE
             SQB=H-IH
             SQR=G-H
             IF(NN.LE.0)  GO TO 172
             IF( MM(K,LL).EQ.1)  GO TO 172
             IF((SS(K,LL)-MM(K,LL)).EQ.0)  GO TO 172
             IF ((NN-SS(K,LL)).EQ.0)  GO TO 172
             MMEAN=Y3P/NN
```

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```
  171 K11=(1./(MM(K,LL)-1))*(NN-F/NN)
      K12=(1./(MM(K,LL)-1))*(E-D/NN)
      K22=(1./(SS(K,LL)-MM(K,LL)))*(NN-E)
      SQA=IH-((Y3P**2)/NN)
C     PRINT 1011,NN
C     PRINT 1012,IH
C     PRINT 1013 ,MMEAN
  174 MQA=SQA/(MM(K,LL)-1)
      MQB=SQB/(SS(K,LL)-MM(K,LL))
      MQR=SQR/(NN-SS(K,LL))
      GO TO 173
  172 PRINT 1010,MM(K,LL),SS(K,LL),NN
  173 IF ( MQR.LT.0.)  GO TO 71
      SDE=DSQRT(MQR)
      GO TO 72
   71 PRINT 1003,MQR,SQR,NN,SS(K,LL)
      SDE=0.
   72 RSDE=SDE/MMEAN *100.
      SIGB=(MQB-MQR)/K22
      IF (SIGB.LT.0.)  GO TO 73
      SDB=DSQRT(SIGB)
      GO TO 74
   73 CONTINUE
C  73 PRINT 1004,SIGB,MQB,SQR,K22
      SDB=0.
   74 RSDB=SDB/MMEAN *100.
      SIGA=(1./K11)*(MQA-((K12/K22)*MQB)-((1.-(K12/K22))*MQR))
      IF (SIGA.LT.0.) GO TO 75
      SDA=DSQRT(SIGA)
      GO TO 76
   75 CONTINUE
C  75 PRINT 1005,SIGA,K11,MQA,K12,K22,MQB,MQR
      SDA=0.
   76 RSDA=SDA/MMEAN  *100.
      PRINT 1002,TYP(K),IR(LL),MM(K,LL),SS(K,LL),NN,MMEAN,MQR,SDE,RSDE,
     1SIGB,SDB,RSDB,SIGA,SDA,RSDA
   80 CONTINUE
   90 CONTINUE
      RETURN
      END
```

```
FORTRAN IV G1  RELEASE 2.0              LAB6              DATE = 75015          13/37/58
0001                    SUBROUTINE LAB6 (MEANV, IR,TYP,ILAB, MEAN2,IFILIV,NLAB)
               C
               C
               C
               C
               C
               C
               C        THIS SUBROUTINE CALCULATES INTERLAB AND RUN COMPONENTS OF THE
               C        VARIANCES FOR ALL THE ISOTOPIC RATIOS OF EACH MEASURED SAMPLE.
               C
               C        M - LAB
               C        K2 - SAMPLE TYPE
               C        L2 - RUN
               C        LL2 - ISOTOPIC RATIO
               C
               C
0002                    REAL * 8  SQIV(  8,3,11),MEANV(21,8,3,11),MEANA,MEAN2(21, 8,11),SU
                       1M,SUMA,SQL,SG2,SDG,RSDG,SQA,SQR,SIGA2,SDA,SIGE2,SDE,RSDE,RSDCON,DI
                       2FF,RSDA,NLABV( 8,11),MITTEV( 8,11),MITTEL
0003                    DIMENSICN ILAB(21),IR(11),TYP( 8)
0004                    INTEGER * 2   IFILIV(21,8,11),MVAL(8,3,11)
0005                    CCMMCN /HANNA / LINKS,MX,NVAL
                       1/ITEMS/SG2V(21,8,11),SDGV(21,8,11),RSDGV(21,8,11),RSDCOV(21,8,11),
                       1SIGA2V(21,8,11),SDAV(21,8,11),RSDAV(21,8,11),SIGE2V(21,8,11),SDEV
                       2(21,8,11),RSDEV(21,8,11),DIFV(21,8,11)
0006                    REAL*8 SG2V,SDGV,RSDGV,RSDCOV,SIGA2V,SDAV,RSDAV,SIGE2V,SDEV,RSDEV,
                       1DIFV
               C
               C
               C
0007             1000 FORMAT ('1RESULTS OF THE SUBROUTINE LAB6 - TWOFOLD ANALYSIS OF VAR
                       1IANCES'//)
0008             1001 FCRMAT (' K2,LL2 AND NLABB ARE',3I5)
0009             1002 FORMAT (I3,2X,A2,2X,D10.4,2X, D10.4,1X, D10.4,1X,D10.4,2X,
                       1D10.4,1X, D10.4,1X,D10.4,2X, D10.4,1X, D10.4,1X,D10.4)
0010             1003 FORMAT (//)
0011             1004 FORMAT (' SQA=',D11.5,' SQR=',D11.5,' NLAB= ',I3)
0012             1005 FCRMAT (' ALARM      ALARM       ALARM      ')
0013             1006 FORMAT (' THE INTERLAB COMPONENT CF THE VARIANCE IS NEGATIVE,IT IS
                       1 PUT = -5.')
0014             1007 FORMAT (' THE RUN CCMPONENT OF THE VARIANCE IS NEGATIVE,IT IS PUT
                       1=-4.')
0015             1008 FCRMAT (' L=',I3)
0016             1009 FORMAT (' K2=',I3)
0017             1010 FORMAT (' M,K2,L2,LL2, ARE',4I4,'  MEANV IS',D14.4)
0018             1011 FORMAT (' SUM= '    ,D15.8)
0019             1012 FORMAT (' SUMA=SQL FROM DO 7 = ',D15.8)
0020             1013 FCRMAT (' SUMA FROM DO 8  =',D15.8)
```

```
 1014 FORMAT (' M,SG2V AND IFILIV ARE :',I4,D15.8,I4,' MEANV IS',D15.8)
C
C     THE DO LOOPS ARE ARRANGED IN THE ORDER WANTED FOR THE OUTPUT LIST
C     THE NORMAL ORDER OF ISOTOPIC RATIOS IS: 83,92,02,38,48,58,68,89,09,19,29
C     THE ORDER WISHED HERE IS:                83,38,48,58,68,92,02,89,09,19,29
C
      PRINT 1000
      L2=1
C     DO-LOOP OVER THE ISOTOPIC RATIOS
      DO 999 L=1,13
C     PRINT 1008,L
      LL2=L
      IF(L.EQ.2) GO TO 999
      IF(L.EQ.3)  GO TO 999
      IF(L.EQ.8) LL2=2
      IF(L.EQ.9) LL2=3
      IF(L.GT.9) LL2=L-2
C     DO-LOOP OVER THE SAMPLE TYPES
C     THE SAMPLE TYPES ARE  US,PS,AU,BU,RU,AS,BS,RS
      DO 998  K2=1,8
C     PRINT 1009,K2
C     TRICK FOR ORGANISATION OF THE OUTPUT LIST
C     LAB 10 WITH THE INDEX M=8 HAS MEASURED EVERYTHING
      M=8
C     PRINT 1010,M,K2,L2,LL2,MEANV(M,K2,L2,LL2)
      IF(MEANV(M,K2,L2,LL2).LT.-2.) GO TO 998
      NLAB = 19
      NLABB=19
      SUM=0.
C     CALCULATION OF THE MEAN OVER ALL THE LABS
      DO 5 M=1,NLAB
C     TEST,IF A LAB IS MISSING IN THE SENSE THAT ONLY ONE RUN WAS MEASURED
      IF (IFILIV(M,K2,LL2).LT.2) GO TO 6
      SUM=SUM+MEAN2(M ,K2,LL2)
      GO TO 5
    6 NLABB=NLABB-1
    5 CONTINUE
C     PRINT 1011,SUM
      NLABV(K2,LL2) = NLABB
C     PRINT 1001,K2,LL2,NLABB
   84 IF(NLABB.EQ.0)  GO TO 86
      MITTEL=SUM/NLABB
      GO TO 87
   86 MITTEL=0.
   87 CONTINUE
      SQL=0.
      SG2=0.
      SDG=0.
```

```
FORTRAN IV G1   RELEASE 2.0            LAB6              DATE = 75015          13/37/58

                  RSDG=0.
            C
                  SQA=0.
                  SIGA2=0.
                  SDA=0.
                  RSDA=0.
            C
                  SQR = 0.
                  SIGE2=0.
                  SDE=0.
                  RSDE=0.
            C     CALCULATION OF THE VARIANCE
                  SUMA=0.
                  DO 7 M=1,NLAB
                  IFILI=IFILIV(M,K2,LL2)
                  IF(IFILI.LT.2)  GO TO  7
                  SUMA=SUMA+(MEAN2(M ,K2,LL2)-MITTEL)**2
                7 CONTINUE
                  SQL=SUMA
            C     PRINT 1012,SQL
                  SUMA=0.
                  DO 8 M=1,NLAB
                  IF(MEAN2(M,K2,LL2).LE.0.) GO TO 8
                  SUMA=SUMA + (MEAN2(M,K2,LL2)-MITTEL)**2
                8 CONTINUE
            C     PRINT 1013,SUMA
                  IF(NLABB.LE.1)  GO TO 89
                  SG2=SQL/(NLABB*(NLABB-1))
                  SDG=DSQRT(SG2)
                  IF(MITTEL.LE.0.)  GO TO 89
                  RSDG=(SDG/MITTEL)*100.
               89 CONTINUE
            C
            C     THE FOLLOWING CALCULATION IS O.K. FOR THE NORMAL CASE WITH 3 RUNS
                  SQA=3.*SQL
                  DO 9  M=1,NLAB
            C     PRINT 1014,M,SG2V(M,K2,LL2),IFILIV(M,K2,LL2),MEAN2(M,K2,LL2)
                9 SQR=SQR+SG2V(M,K2,LL2) * 6.
            C     PRINT 1004,SQA,SQR,NLABB
                  IFILI=3
                  IF(NLABB.LE.1)  GO TO 15
                  SIGA2=(1./IFILI)*((SQA/(NLABB-1))-(SQR/(NLABB*(IFILI-1))))
                  GO TO 18
               15 SIGA2=-5.
               18 IF (SIGA2.LT.0.00000000)  GO TO 10
                  SDA=DSQRT(SIGA2)
                  IF(MITTEL. LT.0.)  GO TO 11
                  RSDA=(SDA/MITTEL)*100.
```

```
FORTRAN IV G1  RELEASE 2.0              LAB6              DATE = 75015           13/37/58
 0091                    GO TO 12
                  C   10 PRINT 1006
 0092                 10 CONTINUE
 0093                    SDA =-5.
 0094                 11 RSDA = -5.
 0095                 12 NUM=NLABB*IFILI
 0096                    IF((NUM-NLABB).LE.0)  GO TO 16
 0097                    SIGE2=SQR/(NUM-NLABB)
 0098                    GO TO 19
 0099                 16 SIGE2=-4.
 0100                 19 IF(SIGE2.LT.0.00000000)  GO TO 20
 0101                    SDE=DSQRT(SIGE2)
 0102                    IF(MITTEL. LT.0.)  GO TO 13
 0103                    RSDE=(SDE/MITTEL)*100.
 0104                    GO TO 14
 0105                 20 PRINT 1007
 0106                    SDE=-4.
 0107                 13 RSDE=-4.
                  C      PRINTING OF THE RESULTS
 0108                 14 IF(L.EQ.8) PRINT 1003
                  C      EXTRA BLOCK FOR PLUTONIUM RESULTS
 0109                    PRINT 1002,IR(LL2),TYP(K2),MITTEL,SG2,SDG,RSDG,SIGA2,SDA,RSDA,
                        1SIGE2,SDE,RSDE
 0110                998 CONTINUE
 0111                999 CONTINUE
 0112                    RETURN
 0113                    END
```

```
FORTRAN IV G1  RELEASE 2.0            DRY            DATE = 75015            13/37/58

0001                   SUBROUTINE DRY(M,MEAN2,ILAB,DICO)
                 C
                 C
                 C
                 C
                 C
                 C
0002                   COMMON/HANNA/LINKS,MX,NVAL/DRYA/ KO(21,3,5,2),KOAL(21,3,5,2)
0003                   REAL*8 SU,SPU,MEAN2(21,8,11),RSU,RPU,RSPU,RPPU,SUM,
                      1SIGMA(2,2,3),SD(2,2,3),RSD(2,2,3),DX(10),GS(21,2),GP(21,2),
                      2R(2,2,3)/12*0./,RR(2,2)/4*0./,D,SQI,XR(2,2,3),XRMEAN(2,2)
                      3,KO,KOAL,SIGLAB(2,2),SDLAB(2,2),RSDLAB(2,2),A,SUMA,SQILAB
                      4,DY(10),DICO(2),SUMIT(2,2),XMIT(2,2),DUCO(2)
                 C
0004                   DIMENSION ILAB(21),ISAMP(21),IRUN(21),IREL(21),IEXP(21)
                 C
0005              1000 FORMAT (I1,I2,1X,I1,I2,1X,I2,5F10.6)
0006              1001 FORMAT (10X,7F10.6)
0007              1002 FORMAT (/10F10.6,5X,2F10.6,I3)
0008              1003 FORMAT (///'1RESULTS OF THE DRY SPIKE EXPERIMENT'///,21X,
                      1' SAMPLE A-1',2X,' SAMPLE A-2')
0009              1004 FORMAT (/' FOR URANIUM')
0010              1005 FORMAT(//' RESULTS OF THE STANDARD EXPERIMENT FOR COMPARISON'
                      1/21X,' SAMPLE A')
0011              1006 FORMAT (//' RUN AND LAB MEANS,VALUES OF THE DRY SPIKE EXPERIMENT'
                      1/' IN THE ORDER:SAMPLE 1-U233/238, SAMPLE 2-U233/238, SAMPLE 1-PU2
                      242/239, SAMPLE 2-PU242/239'/ ' VARIANCE ETC. OF SINGLE MEASUREMENT
                      3S ARE GIVEN'//' RUN NO.    RUN MEAN    SIGMA        SD           RSD'/
                      43(I3,7X,D11.5,3D11.3/))
0012              1007 FORMAT (/' FOR PLUTONIUM')
0013              1008 FORMAT(' URANIUM RESULTS:'/' NUMBER OF ATOMS 1  ',2D13.5/
                      1' NUMBER OF ATOMS 2  ',2D13.5/' NUMBER OF ATOMS 3  ',2D13.5//
                      2' PLUTONIUM RESULTS:'/' NUMBER OF ATOMS 1  ',2D13.5/' NUMBER OF AT
                      3OMS 2  ',2D13.5/' NUMBER OF ATOMS 3  ',2D13.5)
0014              1009 FORMAT (' MEAN NUMBER OF ATOMS'/' FOR URANIUM:',8X,2D12.5/
                      1' FOR PLUTONIUM:',6X,2D12.5)
0015              1010 FORMAT (//' CALCULATION ON THE BASIS OF THE THREE DIFFERENT ISOTOP
                      1IC RATIOS MEASURED IN THE DRY SPIKE EXPERIMENT')
0016              1011 FORMAT (/' NUMBER OF ATOMS 1  ',D12.5/' NUMBER OF ATOMS 2  ',
                      1D12.5/' NUMBER OF ATOMS 3  ',D12.5)
0017              1012 FORMAT ('1RESULTS OF THE SUBROUTINE DRY FOR THE LAB WITH CODE NO.:
                      1',I3)
0018              1013 FORMAT (' THE DIXON OUTPUT VALUES ARE:',10F10.6)
0019              1014 FORMAT (//' CALCULATION ON THE BASIS OF THREE RESULTING NUMBERS OF
                      1 ATOMS CALCULATED FOR THE DRY SPIKE EXPERIMENT')
0020              1015 FORMAT (' MEAN NUMBER OF ATOMS'/18X,'SAMPLE A-1  SD(MEAN)    RSD(M
                      1EAN)    SAMPLE A-2  SD(MEAN)    RSD(MEAN)'/' URANIUM',9X,6D12.5/' P
                      2LUTONIUM',7X,6D12.5)
```

```
 1016 FORMAT (4I4,7D12.5)
 1017 FORMAT (//' *** XR=8.888 ***')
C
      PRINT 1012 ,ILAB(M)
C
      NOUT = 0
      NVAL = 8
      MX=10
C
      SU=2.0931E+18
      SPU=2.4594E+16
      RSU=MEAN2(M,1,1)
      RPU=MEAN2(M,3,4)
      RSPU=MEAN2(M,2,2)
      RPPU=MEAN2(M,3,11)
C     DO OVER THE RATIOS U233/238 AND PU242/239
      DO 50 ID=1,2
C
C     DO OVER THE SAMPLES 1 AND 2
      DO 40 JD=1,2
      SUMA=0.
C
C     DO OVER THE THREE RUNS
      DO 30 KD=1,3
      READ (5,1000) IEXP(M),ILAB(M),ISAMP(M),IRUN(M),IREL(M),(DX(I),I=1,
     15)
      ISA=ISAMP(M)
      READ (5,1001) (DX(I),I=6,10),GS(M,ISA),GP(M,ISA)
      PRINT 1002,(DX(I),I=1,10),GS(M,ISA),GP(M,ISA),ISA
C     MASS DISCRIMINATION CORRECTIONS
      IF(ILAB(M).NE.13) GO TO 17
      DUCO(1)=0.9871
      DUCO(2)=1.00847
      DO 16 LC=1,10
   16 DX(LC)=DX(LC) * DUCO(ID)
   17 IF(ILAB(M).NE.18) GO TO 19
      DO 18 LC=1,10
   18 DX(LC)=DX(LC)* DICO(ID)
   19 CALL DIXON(DX,DY,NOUT)
      SUM=0.
      DO 20 LD=1,8
   20 SUM=SUM+DY(LD)
      IF(ILAB(M).NE.18) GO TO 21
      PRINT 1013,(DY(I),I=1,8),SUM
   21 SQI=0.
      R(ID,JD,KD)=SUM/8.
C     PRINT 1013,(DY(I),I=1,8),SUM,R(ID,JD,KD)
      DO 10 LD=1,8
```

```
FORTRAN IV G1  RELEASE 2.0              DRY                 DATE = 75015           13/37/58
 0058                  D=DY(LD)-R(ID,JD,KD)
 0059               10 SQI=SQI+D**2
 0060                  SIGMA(ID,JD,KD)=SQI/7.
 0061                  A=SIGMA(ID,JD,KD)
 0062                  SD(ID,JD,KD)=DSQRT(A)
 0063                  RSD(ID,JD,KD)=(SD(ID,JD,KD)/R(ID,JD,KD))*100.
 0064                  SUMA=SUMA+R(ID,JD,KD)
               C
               C       TEST FOR SPECIAL COMBINATION OF NUMBERS
 0065                  IF((R(1,JD,KD)-RPU).LE.0.) GO TO 11
               C
               C       NO. OF ATOMS FOR URANIUM
 0066                  XR(1,JD,KD)=(SU*GS(M,JD)*(1.-R(1,JD,KD)*RSU))/(GP(M,JD)*(R(1,
                      1JD,KD)-RPU))
               C       PRINT 1016,ID,JD,KD,M,XR(1,JD,KD),SU,GS(M,JD),R(1,JD,KD),RSU,GP
               C      1(M,JD),RPU
 0067                  GO TO 12
 0068               11 XR(1,JD,KD)=8.888
 0069                  PRINT 1017
 0070               12 IF(ID.EQ.1)  GO TO 30
               C
               C       NO. OF ATOMS FOR PLUTONIUM
 0071                  XR(2,JD,KD)=(SPU*GS(M,JD)*(1.-R(2,JD,KD)*RSPU))/
                      1(GP(M,JD)*(R(2,JD,KD)-RPPU))
               C       PRINT 1016,ID,JD,KD,M,XR(2,JD,KD),SPU,GS(M,JD),R(2,JD,KD),RSPU,GP
               C      1(M,JD),RPPU
 0072               30 CONTINUE
 0073                  RR(ID,JD)=SUMA/3.
 0074                  SQILAB=0.
 0075                  SUMIT(ID,JD)=0.
 0076                  DO 29 KD=1,3
 0077                  SUMIT(ID,JD)=SUMIT(ID,JD) + XR(ID,JD,KD)
 0078                  D=R(ID,JD,KD) - RR(ID,JD)
 0079               29 SQILAB=SQILAB+ D**2
 0080                  SIGLAB(ID,JD)=SQILAB/6.
 0081                  SDLAB(ID,JD)=DSQRT(SIGLAB(ID,JD))
 0082                  RSDLAB(ID,JD)=(SDLAB(ID,JD)/RR(ID,JD))*100.
 0083                  XMIT(ID,JD)=SUMIT(ID,JD)/3.
 0084                  XRMEAN(1,JD)=(SU*GS(M,JD)*(1.-RR(1,JD)*RSU))/(GP(M,JD)*RR(1,
                      1JD)-RPU)
 0085                  IF(ID.EQ.1)  GO TO 40
 0086                  XRMEAN(2,JD)=(SPU*GS(M,JD)*(1.-RR(2,JD)*RSPU))/(GP(M,JD)
                      1 *RR(2,JD)-RPPU)
 0087               40 CONTINUE
 0088               50 CONTINUE
 0089                  PRINT 1006,(((KD,R(ID,JD,KD),SIGMA(ID,JD,KD),SD(ID,JD,KD),RSD
                      1(ID,JD,KD),KD=1,3),JD=1,2),ID=1,2)
 0090                  PRINT 1005
```

```
0091            PRINT 1004
0092            PRINT 1011 ,(KO(M,L4,3,1),L4=1,3)
0093            PRINT 1007
0094            PRINT 1011,(KO(M,L4,3,2),L4=1,3)
0095            PRINT 1003
0096            PRINT 1008 ,(((XR(ID,JD,KD),JD=1,2),KD=1,3),ID=1,2)
0097            PRINT 1010
0098            PRINT 1009 ,((XRMEAN(ID,JD),JD=1,2),ID=1,2)
0099            PRINT 1014
0100            PRINT 1015,(((XMIT(ID,JD),SDLAB(ID,JD),RSDLAB(ID,JD)),JD=1,2),ID=1
               1,2)
0101            RETURN
0102            END
```

12. Example of Evaluation-Results for One Laboratory and the Results for the Group of Laboratories

12.1 Results of One Laboratory for the Standard Experiment

We are very grateful to the laboratory with code number 15 for the allowance to publish their data.

```
NEW SERIES OF MEASURING RESULTS

15  US1 83
THE ORDERED VALUES S(I) ARE:  0.021770 0.021820 0.021910 0.021960 0.021990 0.021990 0.022140 0.022170 0.022250 0.022280
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.021990  0.021820  0.022170  0.021990  0.022280  0.022140  0.021770  0.021910

15  US2 83
THE ORDERED VALUES S(I) ARE:  0.021330 0.021640 0.021650 0.021690 0.021730 0.021820 0.021870 0.021890 0.022030 0.022230
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.021330  0.022030  0.022230  0.021690  0.021890  0.021640  0.021870  0.021820

15  US3 83
THE ORDERED VALUES S(I) ARE:  0.021710 0.021760 0.021800 0.021810 0.021820 0.021840 0.021910 0.021920 0.021930 0.021940
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.021710  0.021800  0.021810  0.021840  0.021930  0.021940  0.021910  0.021760

15  PS1 92
THE ORDERED VALUES S(I) ARE:  0.000197 0.000203 0.000211 0.000220 0.000222 0.000223 0.000224 0.000229 0.000229 0.000255
THE MAXIMUM VALUE S( 10)= 0.000255 IS CANCELLED
THE RESULTING VALUES X(I) ARE           0.000222  0.000223  0.000211  0.000229  0.000203  0.000229  0.000224  0.000220
THE NUMBER OF OUTLIERS IS    1

15  PS1  2
THE ORDERED VALUES S(I) ARE:  0.000780 0.000790 0.000790 0.000810 0.000810 0.000830 0.000840 0.000850 0.000890 0.000900
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.000810  0.000810  0.000850  0.000900  0.000790  0.000890  0.000840  0.000830

15  PS2 92
THE ORDERED VALUES S(I) ARE:  0.000190 0.000204 0.000205 0.000211 0.000223 0.000223 0.000233 0.000236 0.000238 0.000246
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.000211  0.000190  0.000204  0.000205  0.000223  0.000233  0.000223  0.000246

15  PS2  2
THE ORDERED VALUES S(I) ARE:  0.000843 0.000847 0.000849 0.000850 0.000860 0.000862 0.000864 0.000875 0.000880 0.000890
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.000890  0.000880  0.000875  0.000843  0.000847  0.000850  0.000864  0.000860

15  PS3 92
THE ORDERED VALUES S(I) ARE:  0.000201 0.000224 0.000226 0.000231 0.000231 0.000232 0.000237 0.000243 0.000250 0.000256
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.000232  0.000224  0.000237  0.000201  0.000250  0.000231  0.000226  0.000231

15  PS3  2
THE ORDERED VALUES S(I) ARE:  0.000831 0.000833 0.000836 0.000840 0.000845 0.000850 0.000852 0.000853 0.000860 0.000879
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.000852  0.000831  0.000833  0.000840  0.000845  0.000850  0.000853  0.000879

15  AU1 38
A SERIES OF X(I) COULD NOT BE MEASURED

15  AU1 48
THE ORDERED VALUES S(I) ARE:  0.000162 0.000162 0.000164 0.000166 0.000168 0.000168 0.000171 0.000173 0.000174 0.000176
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.000168  0.000162  0.000176  0.000174  0.000162  0.000173  0.000168  0.000171

15  AU1 58
THE ORDERED VALUES S(I) ARE:  0.022300 0.022300 0.022300 0.022400 0.022400 0.022400 0.022600 0.022600 0.022700 0.022700
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                        0.022300  0.022300  0.022600  0.022700  0.022400  0.022700  0.022400  0.022600

15  AU1 68
THE ORDERED VALUES S(I) ARE:  0.003900 0.003930 0.003930 0.003950 0.003990 0.004000 0.004000 0.004010 0.004030
THE RESULTING VALUES X(I) ARE           0.003930  0.003950  0.004000  0.004000  0.003990  0.003930  0.003900  0.004010
```

```
15  AU2 38
A SERIES OF X(I) COULD NOT BE MEASURED

15  AU2 48
THE ORDERED VALUES S(I) ARE:  0.000162 0.000164 0.000167 0.000168 0.000169 0.000170 0.000177 0.000179 0.000183 0.000187
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000179  0.000164  0.000162  0.000170  0.000168  0.000187  0.000169  0.000177

15  AU2 58
THE ORDERED VALUES S(I) ARE:  0.021800 0.021900 0.022100 0.022200 0.022300 0.022400 0.022600 0.022600 0.022700 0.022700
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.021800  0.022100  0.021900  0.022300  0.022700  0.022400  0.022600  0.022600

15  AU2 68
THE ORDERED VALUES S(I) ARE:  0.003840 0.003930 0.003940 0.003940 0.003980 0.003980 0.004000 0.004010 0.004070 0.004100
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.003930  0.003840  0.003980  0.003940  0.003980  0.003940  0.004010  0.004070

15  AU3 38
A SERIES OF X(I) COULD NOT BE MEASURED

15  AU3 48
THE ORDERED VALUES S(I) ARE:  0.000153 0.000154 0.000159 0.000165 0.000168 0.000170 0.000181 0.000186 0.000196 0.000204
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000153  0.000154  0.000165  0.000186  0.000159  0.000196  0.000168  0.000170

15  AU3 58
THE ORDERED VALUES S(I) ARE:  0.022200 0.022200 0.022200 0.022300 0.022400 0.022400 0.022400 0.022400 0.022600 0.022600
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.022400  0.022200  0.022400  0.022200  0.022600  0.022400  0.022600  0.022200

15  AU3 68
THE ORDERED VALUES S(I) ARE:  0.003850 0.003890 0.003920 0.003920 0.003970 0.004010 0.004010 0.004010 0.004060 0.004150
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.003920  0.004010  0.003920  0.004010  0.003890  0.004150  0.003970  0.003850

15  BU1 38
A SERIES OF X(I) COULD NOT BE MEASURED

15  BU1 48
THE ORDERED VALUES S(I) ARE:  0.000159 0.000166 0.000170 0.000176 0.000185 0.000185 0.000189 0.000191 0.000204 0.000213
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000191  0.000159  0.000204  0.000185  0.000170  0.000176  0.000213  0.000166

15  BU1 58
THE ORDERED VALUES S(I) ARE:  0.021900 0.022000 0.022100 0.C22200 0.022300 0.022300 0.022400 0.022500 0.022500 0.022500
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.022500  0.022000  0.022400  0.022200  0.022300  0.022100  0.021900  0.022500

15  BU1 68
THE ORDERED VALUES S(I) ARE:  0.003850 0.003910 0.003920 0.003920 0.003940 0.003940 0.003960 0.003960 0.003990 0.004010
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.003920  0.003910  0.003850  0.003990  0.003940  0.003940  0.004010  0.003920

15  BU2 38
A SERIES OF X(I) COULD NOT BE MEASURED

15  BU2 48
THE ORDERED VALUES S(I) ARE:  0.000158 0.000159 0.000166 0.000176 0.000181 0.000184 0.000188 0.000192 0.000197 0.000197
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000188  0.000158  0.000159  0.000176  0.000184  0.000192  0.000166  0.000197

15  BU2 58
THE ORDERED VALUES S(I) ARE:  0.022100 0.022100 0.022200 0.022300 0.022400 0.022400 0.022500 0.022500 0.022600 0.022600
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.022100  0.022100  0.022500  0.022500  0.022400  0.022300  0.022200  0.022400
```

15 BU2 68
THE ORDERED VALUES S(I) ARE: 0.003930 0.003960 0.003960 0.003980 0.003980 0.004010 0.004010 0.004020 0.004020 0.004020
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.003930 0.003960 0.004020 0.004020 0.003980 0.004010 0.004010 0.003960

15 BU3 38
A SERIES OF X(I) COULD NOT BE MEASURED

15 BU3 48
THE ORDERED VALUES S(I) ARE: 0.000155 0.000168 0.000171 0.000175 0.000175 0.000177 0.000178 0.000179 0.000179 0.000186
THE MINIMUM VALUE S(1)= 0.000155 IS CANCELLED
THE RESULTING VALUES X(I) ARE 0.000171 0.000178 0.000186 0.000175 0.000168 0.000179 0.000179 0.000175
THE NUMBER OF OUTLIERS IS 1

15 BU3 58
THE ORDERED VALUES S(I) ARE: 0.022200 0.022300 0.022300 0.022400 0.022400 0.022400 0.022500 0.022500 0.022500 0.022600
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.022600 0.022300 0.022200 0.022500 0.022400 0.022400 0.022500 0.022400

15 BU3 68
THE ORDERED VALUES S(I) ARE: 0.003890 0.003920 0.003920 0.003930 0.003950 0.003960 0.003970 0.003970 0.003980 0.003990
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.003960 0.003980 0.003970 0.003990 0.003970 0.003950 0.003920 0.003930

15 RU1 38
A SERIES OF X(I) COULD NOT BE MEASURED

15 RU1 48
THE ORDERED VALUES S(I) ARE: 0.000059 0.000062 0.000062 0.000062 0.000063 0.000065 0.000065 0.000065 0.000068 0.000068
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.000068 0.000068 0.000065 0.000065 0.000063 0.000062 0.000062 0.000065

15 RU1 58
THE ORDERED VALUES S(I) ARE: 0.007280 0.007280 0.007290 0.007330 0.007340 0.007340 0.007370 0.007380 0.007390 0.007420
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.007420 0.007390 0.007280 0.007340 0.007330 0.007380 0.007370 0.007280

15 RU1 68
A SERIES OF X(I) COULD NOT BE MEASURED

15 RU2 38
A SERIES OF X(I) COULD NOT BE MEASURED

15 RU2 48
THE ORDERED VALUES S(I) ARE: 0.000033 0.000042 0.000045 0.000047 0.000050 0.000057 0.000058 0.000059 0.000067 0.000075
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.000050 0.000058 0.000042 0.000075 0.000045 0.000057 0.000047 0.000059

15 RU2 58
THE ORDERED VALUES S(I) ARE: 0.007190 0.007200 0.007220 0.007260 0.007290 0.007310 0.007370 0.007430 0.007430 0.007460
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.007370 0.007260 0.007430 0.007290 0.007310 0.007460 0.007220 0.007430

15 RU2 68
A SERIES OF X(I) COULD NOT BE MEASURED

15 RU3 38
A SERIES OF X(I) COULD NOT BE MEASURED

15 RU3 48
THE ORDERED VALUES S(I) ARE: 0.000070 0.000080 0.000081 0.000083 0.000084 0.000086 0.000098 0.000104 0.000109 0.000113
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.000081 0.000086 0.000084 0.000070 0.000098 0.000080 0.000083 0.000109

15 RU3 58
THE ORDERED VALUES S(I) ARE: 0.007290 0.007320 0.007330 0.007330 0.007390 0.007430 0.007430 0.007470 0.007490 0.007500
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.007430 0.007330 0.007330 0.007290 0.007500 0.007490 0.007390 0.007320

15 RU3 68
A SERIES OF X(I) COULD NOT BE MEASURED

15 AU1 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 AU1 9
THE ORDERED VALUES S(I) ARE: 0.228900 0.228900 0.229100 0.230000 0.230000 0.230500 0.230700 0.231200 0.231400 0.231400
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.228900 0.229100 0.231400 0.230000 0.230500 0.230700 0.231400 0.228900

15 AU1 19
THE ORDERED VALUES S(I) ARE: 0.125900 0.126000 0.126500 0.126600 0.126600 0.127100 0.127300 0.127300 0.128100 0.128300
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.125900 0.126600 0.127300 0.127100 0.126000 0.127300 0.128100 0.128300

15 AU1 29
THE ORDERED VALUES S(I) ARE: 0.022700 0.022800 0.022900 0.022900 0.022900 0.023000 0.023000 0.023000 0.023100 0.023300
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.023000 0.022900 0.022700 0.022800 0.023000 0.023300 0.022900 0.023000

15 AU2 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 AU2 9
THE ORDERED VALUES S(I) ARE: 0.229600 0.229800 0.229800 0.230400 0.230600 0.230800 0.230800 0.231400 0.231600 0.231800
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.231800 0.230800 0.230600 0.231600 0.231400 0.229800 0.230800 0.229800

15 AU2 19
THE ORDERED VALUES S(I) ARE: 0.124600 0.125000 0.125200 0.125500 0.125600 0.126200 0.126200 0.127300 0.127300 0.127500
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.127300 0.125600 0.125500 0.127500 0.127300 0.126200 0.126200 0.125200

15 AU2 29
THE ORDERED VALUES S(I) ARE: 0.021900 0.022600 0.022700 0.022900 0.022900 0.023000 0.023100 0.023100 0.023300 0.023700
THE MINIMUM VALUE S(1)= 0.021900 IS CANCELLED
THE RESULTING VALUES X(I) ARE 0.023100 0.022700 0.022900 0.023100 0.023000 0.022900 0.022600 0.023700
THE NUMBER OF OUTLIERS IS 1

15 AU3 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 AU3 9
THE ORDERED VALUES S(I) ARE: 0.230300 0.230500 0.230800 0.230900 0.231600 0.232000 0.232500 0.232700 0.233400 0.235200
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.230900 0.230500 0.232000 0.235200 0.231600 0.233400 0.230300 0.230800

15 AU3 19
THE ORDERED VALUES S(I) ARE: 0.125400 0.125900 0.126600 0.127000 0.127100 0.127600 0.128500 0.128700 0.128900 0.129400
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.125900 0.125400 0.126600 0.128700 0.127000 0.128900 0.127600 0.128500

19 AU3 29
THE ORDERED VALUES S(I) ARE: 0.022400 0.022900 0.023100 0.023200 0.023200 0.023300 0.023400 0.023500 0.023600 0.023800
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.023100 0.023200 0.022400 0.022900 0.023500 0.023200 0.023600 0.023800

15 BU1 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

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15  BU1  9
THE ORDERED VALUES S(I) ARE:  0.227700 0.228300 0.228900 0.230200 0.230600 0.230600 0.231000 0.231300 0.231300 0.232100
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.231300  0.231300  0.228300  0.230600  0.228900  0.230600  0.231000  0.230200

15  BU1 19
THE ORDERED VALUES S(I) ARE:  0.125300 0.125800 0.126100 0.126300 0.126700 0.126900 0.127600 0.127800 0.128100 0.128500
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.125300  0.126100  0.126300  0.128100  0.127800  0.126700  0.126900  0.125800

15  BU1 29
THE ORDERED VALUES S(I) ARE:  0.022700 0.022700 0.022800 0.022800 0.022900 0.023000 0.023300 0.023300 0.023300 0.023400
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.023300  0.022800  0.022900  0.023300  0.022800  0.023400  0.022700  0.022700

15  BU2 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15  BU2  9
THE ORDERED VALUES S(I) ARE:  0.229400 0.229700 0.229700 0.230500 0.231300 0.231700 0.231800 0.231800 0.232200 0.232400
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.229700  0.229700  0.230500  0.232400  0.231700  0.232200  0.231800  0.229400

15  BU2 19
THE ORDERED VALUES S(I) ARE:  0.125900 0.126100 0.126500 0.126500 0.126900 0.126900 0.127100 0.127400 0.127500 0.128000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.126500  0.125900  0.127400  0.126900  0.127500  0.126500  0.128000  0.127100

15  BU2 29
THE ORDERED VALUES S(I) ARE:  0.022700 0.022700 0.022700 0.022800 0.022900 0.023000 0.023000 0.023100 0.023200 0.023400
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.022700  0.022900  0.022700  0.022800  0.023000  0.023200  0.023000  0.023100

15  BU3 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15  BU3  9
THE ORDERED VALUES S(I) ARE:  0.229300 0.229400 0.229700 0.229700 0.229900 0.230100 0.230300 0.230600 0.230800 0.231500
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.229400  0.229900  0.230100  0.230600  0.230300  0.231500  0.229700  0.230800

15  BU3 19
THE ORDERED VALUES S(I) ARE:  0.124900 0.125500 0.125600 0.125800 0.125900 0.125900 0.126200 0.126500 0.127000 0.127000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.124900  0.125600  0.125900  0.125900  0.127000  0.125800  0.127000  0.126500

15  BU3 29
THE ORDERED VALUES S(I) ARE:  0.022600 0.022900 0.022900 0.023000 0.023000 0.023000 0.023100 0.023200 0.023200 0.023200
THE MINIMUM VALUE S(1)= 0.022600 IS CANCELLED
THE RESULTING VALUES X(I) ARE 0.023000  0.023000  0.022900  0.023000  0.023200  0.022900  0.023200  0.023100
THE NUMBER OF OUTLIERS IS    1

15  RU1 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15  RU1  9
THE ORDERED VALUES S(I) ARE:  0.026100 0.026200 0.026300 0.C26300 0.026400 0.026600 0.026600 0.026800 0.026800 0.026900
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.026100  0.026800  0.026800  0.026400  0.026300  0.026600  0.026900  0.026200

15  RU1 19
THE ORDERED VALUES S(I) ARE:  0.000732 0.000747 0.000748 0.000748 0.000753 0.000760 0.000767 0.000781 0.000783 0.000787
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000783  0.000748  0.000767  0.000760  0.000753  0.000787  0.000748  0.000781

15  RU1 29
THE ORDERED VALUES S(I) ARE:  0.000015 0.000017 0.000018 0.000020 0.000021 0.000021 0.000022 0.000024 0.000027 0.000034
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THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.000018  0.000024  0.000021  0.000020  0.000015  0.000022  0.000027  0.000034

15  RU2 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15  RU2  9
THE ORDERED VALUES S(I) ARE:  0.026100 0.026100 0.026200 0.026300 0.026400 0.026500 0.026500 0.026600 0.026600 0.026700
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.026600  0.026100  0.026100  0.026300  0.026500  0.026600  0.026700  0.026400

15  RU2 19
THE ORDERED VALUES S(I) ARE:  0.000713 0.000717 0.000719 0.000734 0.000748 0.000754 0.000755 0.000759 0.000764 0.000766
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.000755  0.000754  0.000719  0.000713  0.000766  0.000734  0.000759  0.000748

15  RU2 29
THE ORDERED VALUES S(I) ARE:  0.000035 0.000040 0.000043 0.000044 0.000046 0.000050 0.000051 0.000053 0.000054 0.000057
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.000044  0.000053  0.000054  0.000035  0.000050  0.000046  0.000057  0.000040

15  RU3 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15  RU3  9
THE ORDERED VALUES S(I) ARE:  0.025700 0.025900 0.026000 0.026000 0.026000 0.026000 0.026100 0.026200 0.026300 0.026500
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.026000  0.026500  0.026100  0.026000  0.026000  0.026000  0.025900  0.026200

15  RU3 19
THE ORDERED VALUES S(I) ARE:  0.000742 0.000747 0.000756 0.000763 0.000765 0.000767 0.000768 0.000791 0.000798 0.000814
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.000768  0.000756  0.000742  0.000767  0.000763  0.000791  0.000814  0.000798

15  RU3 29
THE ORDERED VALUES S(I) ARE:  0.000069 0.000071 0.000073 0.000075 0.000077 0.000077 0.000080 0.000081 0.000085 0.000087
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.000071  0.000075  0.000073  0.000080  0.000087  0.000085  0.000081  0.000077

15  AS1 38
THE ORDERED VALUES S(I) ARE:  0.646400 0.647200 0.647400 0.647800 0.648100 0.649300 0.649900 0.650000 0.651200 0.651900
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.647800  0.647200  0.646400  0.649900  0.647400  0.649300  0.648100  0.650000

15  AS1 48
THE ORDERED VALUES S(I) ARE:  0.000246 0.000261 0.000275 0.000283 0.000283 0.000284 0.000290 0.000317 0.000318 0.000319
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.000246  0.000275  0.000283  0.000283  0.000261  0.000317  0.000319  0.000318

15  AS1 58
THE ORDERED VALUES S(I) ARE:  0.022400 0.022440 0.022440 0.022460 0.022460 0.022470 0.022500 0.022510 0.022510 0.022570
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.022440  0.022400  0.022510  0.022440  0.022510  0.022460  0.022470  0.022460

15  AS1 68
THE ORDERED VALUES S(I) ARE:  0.003900 0.003940 0.003970 0.003980 0.003980 0.003990 0.004000 0.004000 0.004000 0.004030
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.003970  0.003900  0.003940  0.003980  0.003990  0.004030  0.004000  0.003980

15  AS2 38
THE ORDERED VALUES S(I) ARE:  0.634000 0.634000 0.638000 0.641000 0.641000 0.642000 0.642000 0.643000 0.644000 0.645000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                         0.644000  0.642000  0.641000  0.641000  0.634000  0.643000  0.645000  0.642000

15  AS2 48
THE ORDERED VALUES S(I) ARE:  0.000356 0.000381 0.000405 0.000405 0.000409 0.000432 0.000434 0.000450 0.000454 0.000462
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THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.000381  0.000356  0.000405  0.000409  0.000405  0.000432  0.000434  0.000454

15  AS2 58
THE ORDERED VALUES S(I) ARE:  0.022200 0.022300 0.022300 0.022300 0.022400 0.022400 0.022500 0.022500 0.022700 0.022800
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.022200  0.022700  0.022500  0.022500  0.022300  0.022800  0.022400  0.022300

15  AS2 68
THE ORDERED VALUES S(I) ARE:  0.003880 0.003890 0.003920 0.003970 0.003980 0.003980 0.004000 0.004030 0.004040 0.004060
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.003920  0.003890  0.004030  0.003880  0.003980  0.003980  0.004040  0.003970

15  AS3 38
THE ORDERED VALUES S(I) ARE:  0.642000 0.642000 0.645000 0.645000 0.646000 0.646000 0.646000 0.647000 0.648000 0.649000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.645000  0.647000  0.649000  0.648000  0.646000  0.646000  0.646000  0.645000

15  AS3 48
THE ORDERED VALUES S(I) ARE:  0.000275 0.000286 0.000289 0.000292 0.000292 0.000295 0.000296 0.000298 0.000308 0.000308
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.000308  0.000308  0.000289  0.000292  0.000296  0.000275  0.000295  0.000292

15  AS3 58
THE ORDERED VALUES S(I) ARE:  0.022000 0.022000 0.022100 0.022200 0.022300 0.022300 0.022300 0.022400 0.022400 0.022600
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.022000  0.022300  0.022100  0.022600  0.022200  0.022300  0.022400  0.022400

15  AS3 68
THE ORDERED VALUES S(I) ARE:  0.003890 0.003890 0.003900 0.003910 0.003910 0.003920 0.003930 0.003950 0.003970 0.003970
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.003970  0.003950  0.003910  0.003910  0.003890  0.003930  0.003920  0.003890

15  BS1 38
THE ORDERED VALUES S(I) ARE:  0.633000 0.634000 0.634000 0.636000 0.637000 0.637000 0.639000 0.639000 0.639000 0.640000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.637000  0.640000  0.636000  0.634000  0.639000  0.639000  0.634000  0.633000

15  BS1 48
THE ORDERED VALUES S(I) ARE:  0.000297 0.000298 0.000299 0.000302 0.000308 0.000312 0.000320 0.000332 0.000335 0.000359
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.000359  0.000332  0.000335  0.000299  0.000308  0.000320  0.000312  0.000298

15  BS1 58
THE ORDERED VALUES S(I) ARE:  0.021900 0.022200 0.022300 0.022300 0.022300 0.022400 0.022400 0.022500 0.022700 0.022800
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.022700  0.022300  0.021900  0.022400  0.022300  0.022400  0.022500  0.022300

15  BS1 68
THE ORDERED VALUES S(I) ARE:  0.003800 0.003840 0.003850 0.003910 0.003910 0.003970 0.003980 0.003990 0.004000 0.004000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.003910  0.003840  0.003850  0.003910  0.003980  0.004000  0.003970  0.003800

15  BS2 38
THE ORDERED VALUES S(I) ARE:  0.625000 0.625000 0.628000 0.629000 0.630000 0.630000 0.631000 0.631000 0.632000 0.634000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.634000  0.631000  0.632000  0.630000  0.630000  0.631000  0.629000  0.625000

15  BS2 48
THE ORDERED VALUES S(I) ARE:  0.000274 0.000275 0.000277 0.000278 0.000278 0.000283 0.000284 0.000287 0.000288 0.000298
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.000287  0.000288  0.000283  0.000274  0.000275  0.000278  0.000278  0.000298

15  BS2 58
THE ORDERED VALUES S(I) ARE:  0.021900 0.022000 0.022100 0.022100 0.022200 0.022300 0.022300 0.022400 0.022400 0.022400
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                             0.022300  0.022400  0.021900  0.022200  0.022400  0.022100  0.022300  0.022400
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15  BS2 68
THE ORDERED VALUES S(I) ARE:  0.003810 0.003910 0.003960 0.003980 0.003980 0.003990 0.004010 0.004040 0.004100 0.004160
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.003980  0.003910  0.003810  0.004040  0.004100  0.004160  0.003960  0.003980

15  BS3 38
THE ORDERED VALUES S(I) ARE:  0.627000 0.628000 0.631000 0.633000 0.636000 0.637000 0.638000 0.639000 0.640000 0.640000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.638000  0.640000  0.631000  0.628000  0.627000  0.633000  0.639000  0.640000

15  BS3 48
THE ORDERED VALUES S(I) ARE:  0.000290 0.000300 0.000302 0.000304 0.000307 0.000311 0.000318 0.000335 0.000338 0.000340
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000304  0.000338  0.000335  0.000318  0.000311  0.000300  0.000290  0.000302

15  BS3 58
THE ORDERED VALUES S(I) ARE:  0.022000 0.022100 0.022300 0.022300 0.022300 0.022400 0.022400 0.022400 0.022600 0.022700
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.022400  0.022100  0.022300  0.022300  0.022000  0.022400  0.022600  0.022700

15  BS3 68
THE ORDERED VALUES S(I) ARE:  0.003840 0.003910 0.003930 0.003930 0.003940 0.003950 0.004010 0.004050 0.004050 0.004100
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.003930  0.003940  0.003840  0.003910  0.003950  0.003930  0.004010  0.004050

15  RS1 38
THE ORDERED VALUES S(I) ARE:  0.755000 0.755000 0.757000 0.758000 0.758000 0.759000 0.760000 0.760000 0.760000 0.762000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.760000  0.759000  0.755000  0.755000  0.758000  0.762000  0.760000  0.758000

15  RS1 48
THE ORDERED VALUES S(I) ARE:  0.000278 0.000286 0.000288 0.000291 0.000295 0.000300 0.000306 0.000308 0.000311 0.000314
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000286  0.000308  0.000288  0.000306  0.000295  0.000314  0.000300  0.000278

15  RS1 58
THE ORDERED VALUES S(I) ARE:  0.007650 0.007650 0.007670 0.007700 0.007700 0.007710 0.007720 0.007730 0.007750 0.007760
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.007650  0.007760  0.007700  0.007670  0.007710  0.007750  0.007650  0.007700

15  RS1 68
THE ORDERED VALUES S(I) ARE:  0.000078 0.000093 0.000096 0.000098 0.000111 0.000113 0.000114 0.000119 0.000119 0.000121
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000114  0.000119  0.000113  0.000121  0.000111  0.000119  0.000098  0.000096

15  RS2 38
THE ORDERED VALUES S(I) ARE:  0.760000 0.760000 0.761000 0.761000 0.762000 0.762000 0.763000 0.764000 0.764000 0.766000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.761000  0.760000  0.766000  0.764000  0.762000  0.764000  0.760000  0.761000

15  RS2 48
THE ORDERED VALUES S(I) ARE:  0.000221 0.000225 0.000227 0.000228 0.000231 0.000234 0.000236 0.000239 0.000242 0.000252
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000221  0.000236  0.000234  0.000252  0.000231  0.000225  0.000242  0.000239

15  RS2 58
THE ORDERED VALUES S(I) ARE:  0.007350 0.007400 0.007400 0.007420 0.007510 0.007550 0.007600 0.007610 0.007620 0.007650
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.007400  0.007420  0.007510  0.007610  0.007650  0.007620  0.007600  0.007550

15  RS2 68
THE ORDERED VALUES S(I) ARE:  0.000030 0.000031 0.000032 0.000033 0.000033 0.000035 0.000036 0.000037 0.000038 0.000039
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                              0.000032  0.000030  0.000031  0.000035  0.000039  0.000038  0.000036  0.000033
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15 RS3 38
THE ORDERED VALUES S(I) ARE: 0.758000 0.759000 0.759000 0.761000 0.761000 0.762000 0.762000 0.762000 0.762000 0.763000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.762000 0.763000 0.762000 0.759000 0.759000 0.758000 0.761000 0.762000

15 RS3 48
THE ORDERED VALUES S(I) ARE: 0.000177 0.000177 0.000186 0.000187 0.000194 0.000195 0.000196 0.000196 0.000196 0.000211
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.000177 0.000177 0.000187 0.000194 0.000196 0.000195 0.000196 0.000196

15 RS3 58
THE ORDERED VALUES S(I) ARE: 0.007550 0.007570 0.007580 0.007590 0.007590 0.007600 0.007610 0.007620 0.007620 0.007630
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.007610 0.007630 0.007620 0.007550 0.007590 0.007570 0.007600 0.007580

15 RS3 68
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 AS1 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 AS1 9
THE ORDERED VALUES S(I) ARE: 0.232300 0.232700 0.233000 0.233000 0.233000 0.233300 0.233400 0.234400 0.234500 0.234500
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.234400 0.233000 0.233000 0.234500 0.232300 0.232700 0.233300 0.233400

15 AS1 19
THE ORDERED VALUES S(I) ARE: 0.125300 0.125800 0.125900 0.126000 0.126000 0.126000 0.126400 0.126400 0.127600 0.128000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.126400 0.125800 0.128000 0.127600 0.126000 0.126000 0.125900 0.126000

15 AS1 29
THE ORDERED VALUES S(I) ARE: 1.286000 1.289000 1.291000 1.292000 1.295000 1.295000 1.299000 1.301000 1.303000 1.305000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
1.292000 1.305000 1.303000 1.301000 1.295000 1.289000 1.291000 1.299000

15 AS2 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 AS2 9
THE ORDERED VALUES S(I) ARE: 0.232700 0.233200 0.233400 0.233500 0.233900 0.233900 0.234000 0.234700 0.235400 0.235700
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.233200 0.233900 0.233900 0.235700 0.233400 0.233500 0.232700 0.234000

15 AS2 19
THE ORDERED VALUES S(I) ARE: 0.125500 0.125700 0.125800 0.125900 0.126100 0.126200 0.126700 0.126700 0.127000 0.127400
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.126100 0.125900 0.127000 0.126700 0.125800 0.126200 0.126700 0.127400

15 AS2 29
THE ORDERED VALUES S(I) ARE: 1.283000 1.288000 1.293000 1.295000 1.297000 1.297000 1.300000 1.300000 1.301000 1.301000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
1.288000 1.293000 1.301000 1.301000 1.283000 1.297000 1.300000 1.300000

15 AS3 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 AS3 9
THE ORDERED VALUES S(I) ARE: 0.232300 0.232800 0.233000 0.233100 0.233800 0.234100 0.234300 0.235000 0.235600 0.236600
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.234300 0.233100 0.233000 0.235000 0.236600 0.234100 0.233800 0.232800

15 AS3 19
THE ORDERED VALUES S(I) ARE: 0.125700 0.125700 0.126000 0.126600 0.126600 0.126600 0.126900 0.127300 0.127300 0.127700
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.127700 0.126600 0.125700 0.125700 0.126000 0.127300 0.126600 0.126600

15 AS3 29
THE ORDERED VALUES S(I) ARE: 1.282000 1.285000 1.286000 1.287000 1.288000 1.288000 1.288000 1.289000 1.289000 1.292000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
1.286000 1.287000 1.288000 1.282000 1.289000 1.288000 1.288000 1.289000

15 BS1 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 BS1 9
THE ORDERED VALUES S(I) ARE: 0.226000 0.228000 0.229000 0.230000 0.230000 0.231000 0.231000 0.231000 0.231000 0.232000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.228000 0.231000 0.229000 0.226000 0.230000 0.231000 0.232000 0.231000

15 BS1 19
THE ORDERED VALUES S(I) ARE: 0.123500 0.124000 0.124600 0.125200 0.125500 0.125700 0.126200 0.126500 0.126600 0.127100
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.124000 0.125700 0.126200 0.126500 0.124600 0.125500 0.123500 0.127100

15 BS1 29
THE ORDERED VALUES S(I) ARE: 1.263000 1.263000 1.264000 1.266000 1.266000 1.267000 1.270000 1.278000 1.279000 1.286000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
1.270000 1.286000 1.266000 1.279000 1.267000 1.264000 1.263000 1.278000

15 BS2 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 BS2 9
THE ORDERED VALUES S(I) ARE: 0.232100 0.232200 0.233800 0.234200 0.234500 0.235400 0.235400 0.235600 0.236000 0.236600
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.235400 0.232100 0.233800 0.234500 0.235600 0.236000 0.236600 0.234200

15 BS2 19
THE ORDERED VALUES S(I) ARE: 0.123300 0.124300 0.124800 0.125200 0.125300 0.125300 0.125600 0.126600 0.126800 0.127200
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.125200 0.125300 0.124300 0.124800 0.126800 0.127200 0.126600 0.125600

15 BS2 29
THE ORDERED VALUES S(I) ARE: 1.254000 1.265000 1.267000 1.267000 1.267000 1.274000 1.280000 1.283000 1.285000 1.294000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
1.267000 1.267000 1.265000 1.274000 1.283000 1.294000 1.285000 1.280000

15 BS3 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 BS3 9
THE ORDERED VALUES S(I) ARE: 0.230400 0.231000 0.232300 0.232500 0.233100 0.233300 0.233300 0.233800 0.236100 0.236800
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.236800 0.233800 0.232300 0.233100 0.233300 0.233300 0.231000 0.230400

15 BS3 19
THE ORDERED VALUES S(I) ARE: 0.125300 0.125500 0.125800 0.126100 0.126200 0.126900 0.127700 0.128000 0.128000 0.128400
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
0.128400 0.128000 0.127700 0.128000 0.126900 0.126100 0.125800 0.125500

15 BS3 29
THE ORDERED VALUES S(I) ARE: 1.271000 1.272000 1.273000 1.277000 1.278000 1.278000 1.281000 1.283000 1.286000 1.286000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
1.286000 1.281000 1.277000 1.283000 1.278000 1.271000 1.273000 1.272000

15 RS1 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15 RS1 9
THE ORDERED VALUES S(I) ARE: 0.031900 0.032600 0.032800 0.032900 0.032900 0.032900 0.033100 0.033200 0.033500 0.034500

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THE MAXIMUM VALUE S( 10)= 0.034500 IS CANCELLED
THE MINIMUM VALUE S(1)= 0.031900 IS CANCELLED
THE RESULTING VALUES X(I) ARE          0.032900   0.032900   0.032800   0.033100   0.033200   0.032900   0.033500   0.032600
THE NUMBER OF OUTLIERS IS    2

15  RS1 19
THE ORDERED VALUES S(I) ARE:  0.001660 0.001840 0.001850 0.001950 0.002000 0.002110 0.002130 0.002190 0.002260 0.002380
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                       0.002190   0.002130   0.002260   0.002110   0.002380   0.002000   0.001950   0.001850

15  RS1 29
THE ORDERED VALUES S(I) ARE:  1.145000 1.147000 1.147000 1.147000 1.154000 1.165000 1.166000 1.171000 1.179000 1.181000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                       1.145000   1.154000   1.166000   1.179000   1.165000   1.147000   1.147000   1.147000

15  RS2 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15  RS2  9
THE ORDERED VALUES S(I) ARE:  0.032300 0.032400 0.032500 0.032500 0.032700 0.032700 0.032800 0.032900 0.032900 0.033000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                       0.032500   0.032700   0.032700   0.032900   0.033000   0.032300   0.032500   0.032400

15  RS2 19
THE ORDERED VALUES S(I) ARE:  0.001800 0.001800 0.001830 0.001830 0.001870 0.001910 0.001920 0.001920 0.001960 0.001970
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                       0.001970   0.001870   0.001830   0.001920   0.001920   0.001910   0.001800   0.001800

15  RS2 29
THE ORDERED VALUES S(I) ARE:  1.163000 1.165000 1.166000 1.168000 1.168000 1.168000 1.169000 1.169000 1.171000 1.172000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                       1.168000   1.165000   1.166000   1.169000   1.168000   1.172000   1.169000   1.168000

15  RS3 89
A SERIES OF X(I) WAS NOT MEASURED BY PURPOSE

15  RS3  9
THE ORDERED VALUES S(I) ARE:  0.032800 0.032800 0.032900 0.033000 0.033000 0.033000 0.033100 0.033100 0.033200 0.033200
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                       0.033000   0.032900   0.032800   0.033000   0.033100   0.033100   0.033200   0.033200

15  RS3 19
THE ORDERED VALUES S(I) ARE:  0.001980 0.001990 0.002000 0.002020 0.002040 0.002050 0.002050 0.002060 0.002080 0.002100
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                       0.002040   0.002050   0.001990   0.002100   0.002020   0.001980   0.002000   0.002080

15  RS3 29
THE ORDERED VALUES S(I) ARE:  1.144000 1.149000 1.150000 1.151000 1.153000 1.154000 1.154000 1.157000 1.161000 1.164000
THE REMAINING X(I) ARE TAKING THE FIRST 8 (NO OUTLIERS):
                                       1.164000   1.157000   1.154000   1.149000   1.154000   1.161000   1.144000   1.151000
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STANDARD EXPERIMENT - RESULTS OF PROGRAM LAB1
MEAN VALUE,VARIANCE,SD AND RSD FOR THE ISOTOPIC RATIOS OF EACH RUN
(8 SCANS/RUN WERE CONSIDERED)

LABRATORY CODE NO: 15 TOTAL NUMBER OF OUTLIERS FOR THIS LAB= 6
THE PU-241 VALUES OF THE UNSPIKED SAMPLES HAVE BEEN CORRECTED FOR AM-241 DECAY

ISOT.RATIO	SAMPLE	RUN	RUN-MEAN	SCAN-VARIANCE	SCAN-SD	SCAN-RSD(%)	NO.OF MEASUREMENTS	NO.OF OUTLIERS
83	US	1	0.22008750D-01	0.31412500D-07	0.17723572D-03	0.80529661D+00	10	0
83	US	2	0.21812500D-01	0.72650000D-07	0.26953664D-03	0.12356981D+01	10	0
83	US	3	0.21837500D-01	0.69642857D-08	0.83452296D-04	0.38215133D+00	10	0
92	PS	1	0.22012500D-03	0.80125000D-10	0.89512569D-05	0.40664427D+01	10	1
92	PS	2	0.21687500D-03	0.32098214D-09	0.17915975D-04	0.82609681D+01	10	0
92	PS	3	0.22900000D-03	0.19142857D-09	0.13835771D-04	0.60418216D+01	10	0
2	PS	1	0.84000000D-03	0.15142857D-08	0.38913824D-04	0.46325981D+01	10	0
2	PS	2	0.86362500D-03	0.28483929D-09	0.16877182D-04	0.19542258D+01	10	0
2	PS	3	0.84787500D-03	0.22755357D-09	0.15084879D-04	0.17791395D+01	10	0
38	AU	1	0.0	0.0	0.0	0.0	0	0
38	AU	2	0.0	0.0	0.0	0.0	0	0
38	AU	3	0.0	0.0	0.0	0.0	0	0
38	BU	1	0.0	0.0	0.0	0.0	0	0
38	BU	2	0.0	0.0	0.0	0.0	0	0
38	BU	3	0.0	0.0	0.0	0.0	0	0
38	RU	1	0.0	0.0	0.0	0.0	0	0
38	RU	2	0.0	0.0	0.0	0.0	0	0
38	RU	3	0.0	0.0	0.0	0.0	0	0
38	AS	1	0.64826250D+00	0.17655357D-05	0.13287346D-02	0.20496861D+00	10	0
38	AS	2	0.64150000D+00	0.11142857D-04	0.33380918D-02	0.52035726D+00	10	0
38	AS	3	0.64650000D+00	0.20000000D-05	0.14142136D-02	0.21874920D+00	10	0
38	BS	1	0.63650000D+00	0.71428571D-05	0.26726124D-02	0.41989197D+00	10	0
38	BS	2	0.63025000D+00	0.67857143D-05	0.26049404D-02	0.41331858D+00	10	0
38	BS	3	0.63450000D+00	0.29428571D-04	0.54248107D-02	0.85497411D+00	10	0
38	RS	1	0.75837500D+00	0.59821429D-05	0.24458420D-02	0.32251089D+00	10	0
38	RS	2	0.76225000D+00	0.47857143D-05	0.21876275D-02	0.28699607D+00	10	0
38	RS	3	0.76075000D+00	0.33571429D-05	0.18322508D-02	0.24084795D+00	10	0
48	AU	1	0.16925000D-03	0.27642857D-10	0.52576475D-05	0.31064387D+01	10	0
48	AU	2	0.17200000D-03	0.70285714D-10	0.83836576D-05	0.48742195D+01	10	0
48	AU	3	0.16887500D-03	0.23098214D-09	0.15198097D-04	0.89996131D+01	10	0
48	BU	1	0.18300000D-03	0.35600000D-09	0.18867962D-04	0.10310362D+02	10	0
48	BU	2	0.17750000D-03	0.22857143D-09	0.15118579D-04	0.85175093D+01	10	0
48	BU	3	0.17637500D-03	0.30267857D-10	0.55016231D-05	0.31192761D+01	10	1
48	RU	1	0.64750000D-04	0.56428571D-11	0.23754699D-05	0.36686793D+01	10	0
48	RU	2	0.54125000D-04	0.11155357D-09	0.10561892D-04	0.19513889D+02	10	0
48	RU	3	0.86375000D-04	0.14312500D-09	0.11963486D-04	0.13850635D+02	10	0
48	AS	1	0.28775000D-03	0.77335714D-09	0.27809300D-04	0.96643960D+01	10	0
48	AS	2	0.40950000D-03	0.97171429D-09	0.31172332D-04	0.76122911D+01	10	0
48	AS	3	0.29437500D-03	0.11283929D-09	0.10622584D-04	0.36085210D+01	10	0
48	BS	1	0.32037500D-03	0.43169643D-09	0.20777306D-04	0.64853080D+01	10	0
48	BS	2	0.28262500D-03	0.65696429D-10	0.81053333D-05	0.28678756D+01	10	0
48	BS	3	0.31225000D-03	0.29050000D-09	0.17044061D-04	0.54584661D+01	10	0
48	RS	1	0.29687500D-03	0.15241071D-09	0.12345473D-04	0.41584753D+01	10	0
48	RS	2	0.23500000D-03	0.95428571D-10	0.97687549D-05	0.41569170D+01	10	0
48	RS	3	0.18975000D-03	0.70785714D-10	0.84134246D-05	0.44339524D+01	10	0
58	AU	1	0.22500000D-01	0.28571429D-07	0.16903085D-03	0.75124823D+00	10	0
58	AU	2	0.22300000D-01	0.11428571D-06	0.33806170D-03	0.15159718D+01	10	0
58	AU	3	0.22375000D-01	0.27857143D-07	0.16690459D-03	0.74594231D+00	10	0
58	BU	1	0.22237500D-01	0.51250000D-07	0.22638463D-03	0.10180309D+01	10	0
58	BU	2	0.22312500D-01	0.26964286D-07	0.16420806D-03	0.73594647D+00	10	0
58	BU	3	0.22412500D-01	0.15535714D-07	0.12464235D-03	0.55612870D+00	10	0
58	RU	1	0.73487500D-02	0.25839286D-08	0.50832358D-04	0.69171434D+00	10	0
58	RU	2	0.73462500D-02	0.79125000D-08	0.88952234D-04	0.12108523D+01	10	0
58	RU	3	0.73850000D-02	0.65142857D-08	0.80711125D-04	0.10929062D+01	10	0

58	AS	1	0.22461250D-01	0.13553571D-08	0.36815175D-04	0.16390528D+00	10	0
58	AS	2	0.22462500D-01	0.42678571D-07	0.20658793D-03	0.91970140D+00	10	0
58	AS	3	0.22287500D-01	0.35535714D-07	0.18850919D-03	0.84580679D+00	10	0
58	BS	1	0.22350000D-01	0.51428571D-07	0.22677868D-03	0.10146697D+01	10	0
58	BS	2	0.22250000D-01	0.31428571D-07	0.17728105D-03	0.79676877D+00	10	0
58	BS	3	0.22350000D-01	0.54285714D-07	0.23299295D-03	0.10424740D+01	10	0
58	RS	1	0.76987500D-02	0.17267857D-08	0.41554611D-04	0.53975790D+00	10	0
58	RS	2	0.75450000D-02	0.88285714D-08	0.93960478D-04	0.12453344D+01	10	0
58	RS	3	0.75937500D-02	0.71250000D-09	0.26692696D-04	0.35150875D+00	10	0
68	AU	1	0.39637500D-02	0.17125000D-08	0.41382363D-04	0.10440205D+01	9	0
68	AU	2	0.39612500D-02	0.44982143D-08	0.67068728D-04	0.16931203D+01	10	0
68	AU	3	0.39650000D-02	0.87428571D-08	0.93503247D-04	0.23582156D+01	10	0
68	BU	1	0.39350000D-02	0.24285714D-08	0.49280538D-04	0.12523644D+01	10	0
68	BU	2	0.39862500D-02	0.11410714D-08	0.33779749D-04	0.84740668D+00	10	0
68	BU	3	0.39587500D-02	0.58392857D-09	0.24164614D-04	0.61041021D+00	10	0
68	RU	1	0.0	0.0	0.0	0.0	0	0
68	RU	2	0.0	0.0	0.0	0.0	0	0
68	RU	3	0.0	0.0	0.0	0.0	0	0
68	AS	1	0.39737500D-02	0.15410714D-08	0.39256483D-04	0.98789513D+00	10	0
68	AS	2	0.39612500D-02	0.35839286D-08	0.59865922D-04	0.15112886D+01	10	0
68	AS	3	0.39212500D-02	0.78392857D-09	0.27998724D-04	0.71402549D+00	10	0
68	BS	1	0.39075000D-02	0.53071429D-08	0.72850140D-04	0.18643670D+01	10	0
68	BS	2	0.39925000D-02	0.11907143D-07	0.10911986D-03	0.27331210D+01	10	0
68	BS	3	0.39450000D-02	0.40000000D-08	0.63245553D-04	0.16031826D+01	10	0
68	RS	1	0.11137500D-03	0.90553571D-10	0.95159640D-05	0.85440754D+01	10	0
68	RS	2	0.34150000D-04	0.10625714D-10	0.32597108D-05	0.95452731D+01	10	0
68	RS	3	0.0	0.0	0.0	0.0	0	0
89	AU	1	0.0	0.0	0.0	0.0	0	0
89	AU	2	0.0	0.0	0.0	0.0	(	0
89	AU	3	0.0	0.0	0.0	0.0	(	0
89	BU	1	0.0	0.0	0.0	0.0	0	0
89	BU	2	0.0	0.0	0.0	0.0	0	0
89	BU	3	0.0	0.0	0.0	0.0	0	0
89	RU	1	0.0	0.0	0.0	0.0	0	0
89	RU	2	0.0	0.0	0.0	0.0	0	0
89	RU	3	0.0	0.0	0.0	0.0	0	0
89	AS	1	0.0	0.0	0.0	0.0	0	0
89	AS	2	0.0	0.0	0.0	0.0	0	0
89	AS	3	0.0	0.0	0.0	0.0	0	0
89	BS	1	0.0	0.0	0.0	0.0	0	0
89	BS	2	0.0	0.0	0.0	0.0	0	0
89	BS	3	0.0	0.0	0.0	0.0	0	0
89	RS	1	0.0	0.0	0.0	0.0	0	0
89	RS	2	0.0	0.0	0.0	0.0	0	0
89	RS	3	0.0	0.0	0.0	0.0	0	0
9	AU	1	0.23011250D+00	0.11126786D-05	0.10548358D-02	0.45840004D+00	10	0
9	AU	2	0.23082500D+00	0.57642857D-06	0.75922893D-03	0.32891972D+00	10	0
9	AU	3	0.23183750D+00	0.28483929D-05	0.16877182D-02	0.72797465D+00	10	0
9	BU	1	0.23027500D+00	0.12335714D-05	0.11106626D-02	0.48232010D+00	10	0
9	BU	2	0.23092500D+00	0.15250000D-05	0.12349089D-02	0.53476622D+00	10	0
9	BU	3	0.23028750D+00	0.44982143D-06	0.67068728D-03	0.29123912D+00	10	0
9	RU	1	0.26512500D-01	0.92678571D-07	0.30443155D-03	0.11482567D+01	10	0
9	RU	2	0.26412500D-01	0.52678571D-07	0.22951813D-03	0.86897540D+00	10	0
9	RU	3	0.26087500D-01	0.35535714D-07	0.18850919D-03	0.72260350D+00	10	0
9	AS	1	0.23332500D+00	0.59928571D-06	0.77413546D-03	0.33178419D+00	10	0
9	AS	2	0.23378750D+00	0.78410714D-06	0.88549825D-03	0.37876201D+00	10	0
9	AS	3	0.23408750D+00	0.15841071D-05	0.12586132D-02	0.53766783D+00	10	0
9	BS	1	0.22975000D+00	0.39285714D-05	0.19820624D-02	0.86270399D+00	10	0
9	BS	2	0.23477500D+00	0.20592857D-05	0.14350212D-02	0.61123252D+00	10	0
9	BS	3	0.23300000D+00	0.37885714D-05	0.19464253D-02	0.83537566D+00	10	0
9	RS	1	0.32987500D-01	0.75535714D-07	0.27483761D-03	0.83315685D+00	10	2
9	RS	2	0.32625000D-01	0.59285714D-07	0.24348658D-03	0.74631902D+00	10	0
9	RS	3	0.33037500D-01	0.19821429D-07	0.14078860D-03	0.42614785D+00	10	0
19	AU	1	0.12773179D+00	0.78158855D-06	0.88407497D-03	0.69213385D+00	10	0
19	AU	2	0.12700304D+00	0.83427181D-06	0.91338481D-03	0.71918340D+00	10	0
19	AU	3	0.12798308D+00	0.17601980D-05	0.13267246D-02	0.10366406D+01	10	0

19	BU	1	0.12727947D+00	0.93169974D-06	0.96524595D-03	0.75836738D+00	10	0
19	BU	2	0.12763127D+00	0.45249863D-06	0.67268019D-03	0.52704965D+00	10	0
19	BU	3	0.12672662D+00	0.52466748D-06	0.72433934D-03	0.57157630D+00	10	0
19	RU	1	0.78488539D-03	0.27139836D-09	0.16474173D-04	0.20989271D+01	10	0
19	RU	2	0.76195500D-03	0.39459757D-09	0.19864480D-04	0.26070411D+01	10	0
19	RU	3	0.79911696D-03	0.60969830D-09	0.24692070D-04	0.30899194D+01	10	0
19	AS	1	0.12724406D+00	0.73163868D-06	0.85535880D-03	0.67221907D+00	10	0
19	AS	2	0.12725663D+00	0.32324437D-06	0.56854584D-03	0.44677108D+00	10	0
19	AS	3	0.12730694D+00	0.52572406D-06	0.72506831D-03	0.56954342D+00	10	0
19	BS	1	0.12622588D+00	0.15995707D-05	0.12647414D-02	0.10019668D+01	10	0
19	BS	2	0.12672488D+00	0.10820070D-05	0.10401957D-02	0.82082988D+00	10	0
19	BS	3	0.12789950D+00	0.12942787D-05	0.11376637D-02	0.88949819D+00	10	0
19	RS	1	0.21239177D-02	0.30069007D-07	0.17340417D-03	0.81643545D+01	10	0
19	RS	2	0.18910044D-02	0.39925352D-08	0.63186511D-04	0.33414259D+01	10	0
19	RS	3	0.20471193D-02	0.18767089D-08	0.43320999D-04	0.21161932D+01	10	0
29	AU	1	0.22950000D-01	0.31428571D-07	0.17728105D-03	0.77246646D+00	10	0
29	AU	2	0.23000000D-01	0.11142857D-06	0.33380918D-03	0.14513443D+01	10	1
29	AU	3	0.23212500D-01	0.19267857D-06	0.43895167D-03	0.18910142D+01	10	0
29	BU	1	0.22987500D-01	0.86964286D-07	0.29489708D-03	0.12828584D+01	10	0
29	BU	2	0.22925000D-01	0.33571429D-07	0.18322508D-03	0.79923697D+00	10	0
29	BU	3	0.23037500D-01	0.14107143D-07	0.11877349D-03	0.51556590D+00	10	1
29	RU	1	0.22625000D-04	0.34267857D-10	0.58538754D-05	0.25873482D+02	10	0
29	RU	2	0.47375000D-04	0.56553571D-10	0.75202109D-05	0.15873796D+02	10	0
29	RU	3	0.78625000D-04	0.31982143D-10	0.56552757D-05	0.71927194D+01	10	0
29	AS	1	0.12968750D+01	0.35553571D-04	0.59626816D-02	0.45977304D+00	10	0
29	AS	2	0.12953750D+01	0.45982143D-04	0.67810134D-02	0.52347879D+00	10	0
29	AS	3	0.12871250D+01	0.52678571D-05	0.22951813D-02	0.17831845D+00	10	0
29	BS	1	0.12716250D+01	0.69982143D-04	0.83655330D-02	0.65786164D+00	10	0
29	BS	2	0.12768750D+01	0.10726786D-03	0.10357020D-01	0.81112244D+00	10	0
29	BS	3	0.12776250D+01	0.29696429D-04	0.54494430D-02	0.42652914D+00	10	0
29	RS	1	0.11562500D+01	0.15392857D-03	0.12406795D-01	0.10730201D+01	10	0
29	RS	2	0.11681250D+01	0.44107143D-05	0.21001701D-02	0.17978984D+00	10	0
29	RS	3	0.11542500D+01	0.41642857D-04	0.64531277D-02	0.55907539D+00	10	0

RESULTS OF PROGRAM LAB2 FOR THE STANDARD EXPERIMENT

FOR EACH LAB AND FOR EACH SAMPLE AND ISOTOPIC RATIO THE FOLLOWING VALUES ARE GIVEN:
LAB MEAN(MEANA) WITH VARIANCE(SG2),STANDARD DEVIATION(SDG) AND RELATIVE STANDARD DEVIATION(RSDG).
IN ADDITION VARIANCE COMPONENTS FOR RUN AND SCAN ARE GIVEN SEPARATELY .

(IF THE RUN OR SCAN COMPONENT OF ANY VARIANCE IS NEGATIVE AND THEREFORE HAS TO BE CONSIDERED AS NEGLIGIBLE,
IT IS PUT = -5.0 (RUN) OR = -4.0 (SCAN),RESPECTIVELY.)

LABORATORY CODE NO.: 15

RAT	SAMP	LAB MEAN	VARIANCE LAB MEAN	STAND. DEV. LAB MEAN	RSD(%) LAB MEAN	VARIANCE RUN	SD RUN	RSD(%) RUN	VARIANCE SCAN	SD SCAN	RSD(%) SCAN
83	US	0.2189D-01	0.3804D-08	0.617D-04	0.282D+00	0.6785D-08	0.824D-04	0.376D+00	0.3701D-07	0.192D-03	0.879D+00
38	AU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	BU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	RU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	AS	0.6454D+00	0.4102D-05	0.203D-02	0.314D+00	0.1169D-04	0.342D-02	0.530D+00	0.4969D-05	0.223D-02	0.345D+00
38	BS	0.6337D+00	0.3396D-05	0.184D-02	0.291D+00	0.8381D-05	0.289D-02	0.457D+00	0.1445D-04	0.380D-02	0.600D+00
38	RS	0.7605D+00	0.1273D-05	0.113D-02	0.148D+00	0.3229D-05	0.180D-02	0.236D+00	0.4708D-05	0.217D-02	0.285D+00
48	AU	0.1700D-03	0.9705D-12	0.985D-06	0.579D+00	-.1079D-10	-.500D+01	-.500D+01	0.1096D-09	0.105D-04	0.616D+01
48	BU	0.1799D-03	0.4189D-11	0.205D-05	0.114D+01	-.1305D-10	-.500D+01	-.500D+01	0.2049D-09	0.143D-04	0.800D+01
48	RU	0.6842D-04	0.9003D-10	0.949D-05	0.139D+02	0.2593D-09	0.161D-04	0.235D+02	0.8677D-10	0.932D-05	0.136D+02
48	AS	0.3305D-03	0.1562D-08	0.395D-04	0.120D+02	0.4609D-08	0.679D-04	0.205D+02	0.6193D-09	0.249D-04	0.753D+01
48	BS	0.3051D-03	0.1316D-09	0.115D-04	0.376D+01	0.3620D-09	0.190D-04	0.624D+01	0.2626D-09	0.162D-04	0.531D+01
48	RS	0.2405D-03	0.9640D-09	0.310D-04	0.129D+02	0.2879D-08	0.537D-04	0.223D+02	0.1062D-09	0.103D-04	0.428D+01
58	AU	0.2239D-01	0.3403D-08	0.583D-04	0.261D+00	0.3095D-08	0.556D-04	0.248D+00	0.5690D-07	0.239D-03	0.107D+01
58	BU	0.2232D-01	0.2569D-08	0.507D-04	0.227D+00	0.3802D-08	0.617D-04	0.276D+00	0.3125D-07	0.177D-03	0.792D+00
58	RU	0.7369D-02	0.1568D-09	0.125D-04	0.170D+00	-.2385D-09	-.500D+01	-.500D+01	0.5670D-08	0.753D-04	0.102D+01
58	AS	0.2240D-01	0.3379D-08	0.581D-04	0.259D+00	0.6821D-08	0.826D-04	0.369D+00	0.2652D-07	0.163D-03	0.727D+00
58	BS	0.2232D-01	0.1111D-08	0.333D-04	0.149D+00	-.2381D-08	-.500D+01	-.500D+01	0.4571D-07	0.214D-03	0.958D+00
58	RS	0.7612D-02	0.2058D-08	0.454D-04	0.596D+00	0.5704D-08	0.755D-04	0.992D+00	0.3756D-08	0.613D-04	0.805D+00
68	AU	0.3963D-02	0.1215D-11	0.110D-05	0.278D-01	-.6194D-09	-.500D+01	-.500D+01	0.4985D-08	0.706D-04	0.178D+01
68	BU	0.3960D-02	0.2193D-09	0.148D-04	0.374D+00	0.4847D-09	0.220D-04	0.556D+00	0.1385D-08	0.372D-04	0.940D+00
68	RU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	AS	0.3952D-02	0.2507D-09	0.158D-04	0.401D+00	0.5059D-09	0.225D-04	0.569D+00	0.1970D-08	0.444D-04	0.112D+01
68	BS	0.3948D-02	0.6049D-09	0.246D-04	0.623D+00	0.9307D-09	0.305D-04	0.773D+00	0.7071D-08	0.841D-04	0.213D+01
68	RS	0.7276D-04	0.1491D-08	0.386D-04	0.531D+02	0.2931D-08	0.541D-04	0.744D+02	0.4068D-09	0.202D-04	0.277D+02
92	PS	0.2220D-03	0.1313D-10	0.362D-05	0.163D+01	0.1470D-10	0.383D-05	0.173D+01	0.1975D-09	0.141D-04	0.633D+01
2	PS	0.8505D-03	0.4823D-10	0.695D-05	0.817D+00	0.6026D-10	0.776D-05	0.913D+00	0.6756D-09	0.260D-04	0.306D+01
89	AU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	BU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	RU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	AS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	BS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	RS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	AU	0.2309D+00	0.2505D-06	0.500D-03	0.217D+00	0.5623D-06	0.750D-03	0.325D+00	0.1512D-05	0.123D-02	0.533D+00
9	BU	0.2305D+00	0.4606D-07	0.215D-03	0.931D-01	0.4494D-08	0.670D-04	0.291D-01	0.1069D-05	0.103D-02	0.449D+00
9	RU	0.2634D-01	0.1646D-07	0.128D-03	0.487D+00	0.4184D-07	0.205D-03	0.777D+00	0.6030D-07	0.246D-03	0.932D+00
9	AS	0.2337D+00	0.4918D-07	0.222D-03	0.949D-01	0.2391D-07	0.155D-03	0.662D-01	0.9892D-06	0.995D-03	0.426D+00
9	BS	0.2325D+00	0.2165D-05	0.147D-02	0.633D+00	0.6087D-05	0.247D-02	0.106D+01	0.3259D-05	0.181D-02	0.776D+00
9	RS	0.3288D-01	0.1689D-07	0.130D-03	0.395D+00	0.4423D-07	0.210D-03	0.640D+00	0.5155D-07	0.227D-03	0.690D+00
19	AU	0.1276D+00	0.8637D-07	0.294D-03	0.230D+00	0.1184D-06	0.344D-03	0.270D+00	0.1125D-05	0.106D-02	0.832D+00
19	BU	0.1272D+00	0.6932D-07	0.263D-03	0.207D+00	0.1284D-06	0.358D-03	0.282D+00	0.6363D-06	0.798D-03	0.627D+00
19	RU	0.7820D-03	0.1172D-09	0.108D-04	0.138D+01	0.2984D-09	0.173D-04	0.221D+01	0.4252D-09	0.206D-04	0.264D+01
19	AS	0.1273D+00	0.3691D-09	0.192D-04	0.151D-01	-.6475D-07	-.500D+01	-.500D+01	0.5269D-06	0.726D-03	0.570D+00
19	BS	0.1270D+00	0.2461D-06	0.496D-03	0.391D+00	0.5726D-06	0.757D-03	0.596D+00	0.1325D-05	0.115D-02	0.907D+00
19	RS	0.2021D-02	0.4695D-08	0.685D-04	0.339D+01	0.1259D-07	0.112D-03	0.555D+01	0.1198D-07	0.109D-03	0.542D+01
29	AU	0.2305D-01	0.6476D-08	0.805D-04	0.349D+00	0.5446D-08	0.738D-04	0.320D+00	0.1118D-06	0.334D-03	0.145D+01
29	BU	0.2298D-01	0.1059D-08	0.325D-04	0.142D+00	-.2433D-08	-.500D+01	-.500D+01	0.4488D-07	0.212D-03	0.922D+00
29	RU	0.4954D-04	0.2625D-09	0.162D-04	0.327D+02	0.7824D-09	0.280D-04	0.565D+02	0.4093D-10	0.640D-05	0.129D+02
29	AS	0.1293D+01	0.9187D-05	0.303D-02	0.234D+00	0.2395D-04	0.489D-02	0.378D+00	0.2893D-04	0.538D-02	0.416D+00
29	BS	0.1275D+01	0.3562D-05	0.189D-02	0.148D+00	0.2065D-05	0.144D-02	0.113D+00	0.6898D-04	0.831D-02	0.651D+00
29	RS	0.1160D+01	0.1875D-04	0.433D-02	0.373D+00	0.4792D-04	0.692D-02	0.597D+00	0.6666D-04	0.816D-02	0.704D+00

RESULTS OF PROGRAM LAB3 FOR THE STANDARD EXPERIMENT

LABORATORY CODE NO.: 15

ISOTOPIC COMPOSITION IN ATOM PERCENTAGES

URANIUM SAMPLE	ATU233	ATU234	ATU235	ATU236	ATU238
AU	0.0	0.16565D-01	0.21813D+01	0.38609D+00	0.97416D+02
BU	0.0	0.17435D-01	0.21745D+01	0.38579D+00	0.97422D+02
RU	0.0	0.67912D-02	0.73057D+00	0.0	0.99263D+02
AS	0.38599D+02	0.19768D-01	0.13399D+01	0.23635D+00	0.59805D+02
BS	0.38170D+02	0.18375D-01	0.13441D+01	0.23781D+00	0.60229D+02
RS	0.43003D+02	0.13602D-01	0.43048D+00	0.41146D-02	0.56549D+02

PLUTONIUM SAMPLE	ATP238	ATP239	ATP240	ATP241	ATP242
AU	0.0	0.72382D+02	0.16715D+02	0.92340D+01	0.16687D+01
BU	0.0	0.72427D+02	0.16694D+02	0.92137D+01	0.16646D+01
RU	0.0	0.97355D+02	0.25641D+01	0.76130D-01	0.48231D-02
AS	0.0	0.37677D+02	0.88064D+01	0.47951D+01	0.48721D+02
BS	0.0	0.37953D+02	0.88244D+01	0.48181D+01	0.48404D+02
RS	0.0	0.45570D+02	0.14985D+01	0.92082D-01	0.52840D+02

RESULTS OF SUBROUTINE ALPHA

LABORATORY CODE NO.: 15

SAMPLE	ALPHA-ACTIVITY MEAN VALUE	VARIANCE	SD	RSD(%)	RSD(%) OF MEAN	RATIO 89
		OF SINGLE MEASUREMENT				
AU	0.22032D+01	0.14303D-04	0.3782D-02	0.1717D+00	0.9911D-01	0.1470D-01
BU	0.22178D+01	0.25056D-02	0.5006D-01	0.2257D+01	0.1303D+01	0.1478D-01
RU	0.10140D-01	0.12000D-06	0.3464D-03	0.3416D+01	0.1972D+01	0.4001D-04
AS	0.21636D+01	0.41429D-02	0.6437D-01	0.2975D+01	0.1718D+01	0.1452D-01
BS	0.21719D+01	0.57173D-02	0.7561D-01	0.3481D+01	0.2010D+01	0.1454D-01
FOR SAMPLE RS NO ALPHA MEASUREMENTS; GIVEN VALUES ARE DUMMIES						
RS	0.99000D+01	0.99000D+01	0.9900D+01	0.9900D+01	0.9900D+01	0.3992D-01

ISOTOPIC COMPOSITION IN ATOM PERCENTAGES,CALCULATED IN PROGRAM LAB3
INCLUDING ALPHA RESULTS

PLUTONIUM SAMPLE	ATAL38	ATAL39	ATAL40	ATAL41	ATAL42
AU	0.10528D+01	0.71620D+02	0.16539D+02	0.91368D+01	0.16511D+01
BU	0.10595D+01	0.71660D+02	0.16517D+02	0.91161D+01	0.16470D+01
RU	0.38946D-02	0.97351D+02	0.25640D+01	0.76127D-01	0.48229D-02
AS	0.54398D+00	0.37472D+02	0.87585D+01	0.47691D+01	0.48456D+02
BS	0.54869D+00	0.37745D+02	0.87760D+01	0.47917D+01	0.48139D+02
RS	0.17867D+01	0.44755D+02	0.14717D+01	0.90436D-01	0.51896D+02

ISOTOPIC COMPOSITION IN WEIGHT PERCENTAGES

URANIUM SAMPLE	GU233	GU234	GU235	GU236	GU238
AU	0.0	0.16291D-01	0.21544D+01	0.38296D+00	0.97446D+02
BU	0.0	0.17146D-01	0.21477D+01	0.38266D+00	0.97452D+02
RU	0.0	0.66774D-02	0.72141D+00	0.0	0.99272D+02
AS	0.38104D+02	0.19598D-01	0.13340D+01	0.23633D+00	0.60306D+02
BS	0.37677D+02	0.18215D-01	0.13382D+01	0.23776D+00	0.60729D+02
RS	0.42485D+02	0.13496D-01	0.42895D+00	0.41175D-02	0.57069D+02

PLUTONIUM SAMPLE	GP238	GP239	GP240	GP241	GP242
AU	0.0	0.72261D+02	0.16757D+02	0.92958D+01	0.16869D+01
BU	0.0	0.72306D+02	0.16736D+02	0.92753D+01	0.16827D+01
RU	0.0	0.97344D+02	0.25745D+01	0.76760D-01	0.48832D-02
AS	0.0	0.37419D+02	0.87827D+01	0.48022D+01	0.48996D+02
BS	0.0	0.37694D+02	0.88010D+01	0.48254D+01	0.48679D+02
RS	0.0	0.45266D+02	0.14947D+01	0.92234D-01	0.53147D+02

ISOTOPIC COMPOSITION IN WEIGHT PERCENTAGES,CALCULATED IN PROGRAM LAB3
INCLUDING ALPHA RESULTS

PLUTONIUM SAMPLE	GPAL 238	GPAL 239	GPAL 240	GPAL 241	GPAL 242
AU	0.10467D+01	0.71504D+02	0.16581D+02	0.91985D+01	0.16692D+01
BU	0.10533D+01	0.71544D+02	0.16560D+02	0.91776D+01	0.16650D+01
RU	0.38778D-02	0.97340D+02	0.25744D+01	0.76757D-01	0.48830D-02
AS	0.53802D+00	0.37218D+02	0.87355D+01	0.47764D+01	0.48732D+02
BS	0.54269D+00	0.37490D+02	0.87532D+01	0.47992D+01	0.48415D+02
RS	0.17677D+01	0.44465D+02	0.14683D+01	0.90604D-01	0.52208D+02

RESULTS OF PROGRAM LAB4
LABORATORY CODE NO.: 15

URANIUM CONCENTRATIONS

U-238 CONCENTRATIONS IN ATOMS/G SOLUTION

	SAMPLE A	SAMPLE B	SAMPLE R	SAMPLE A-CALIBRATED	SAMPLE B-CALIBRATED
NUMBER OF ATOMS 1	0.28753D+19	0.27613D+19	0.27546D+19	0.29081D+19	0.27928D+19
NUMBER OF ATOMS 2	0.29061D+19	0.27891D+19	0.27404D+19	0.29545D+19	0.28355D+19
NUMBER OF ATOMS 3	0.28833D+19	0.27701D+19	0.27459D+19	0.29254D+19	0.28106D+19
NO. OF ATOMS 1-3	0.28882D+19	0.27735D+19	0.27469D+19	0.29293D+19	0.28129D+19
RSD OF MEAN	0.31903D+00	0.29536D+00	0.15094D+00		

URANIUM CONCENTRATIONS IN MG URANIUM/G SOLUTION

C : 1ST RUN	0.11664D+01	0.11201D+01	0.10969D+01	0.11797D+01	0.11328D+01
C : 2ND RUN	0.11789D+01	0.11313D+01	0.10912D+01	0.11985D+01	0.11502D+01
C : 3RD RUN	0.11696D+01	0.11237D+01	0.10934D+01	0.11867D+01	0.11401D+01
CONCENTRATION 1-3	0.11716D+01	0.11250D+01	0.10938D+01	0.11903D+01	0.11424D+01
SIGMA	0.13972D-04	0.11042D-04	0.27258D-05		
STANDARD DEVIATION	0.37379D-02	0.33229D-02	0.16510D-02		
RSD OF MEAN	0.31903D+00	0.29536D+00	0.15094D+00		

FOR LAB NO. 15 AND SAMPLE AU THE RATIO PU 238/239 WAS NOT MEASURED BY MASS SPECTROMETRY.
FOR LAB NO. 15 AND SAMPLE BU THE RATIO PU 238/239 WAS NOT MEASURED BY MASS SPECTROMETRY.
FOR LAB NO. 15 AND SAMPLE RU THE RATIO PU 238/239 WAS NOT MEASURED BY MASS SPECTROMETRY.

PLUTONIUM CONCENTRATIONS

PU-239 CONCENTRATIONS IN ATOMS/G SOLUTION

	SAMPLE A	SAMPLE B	SAMPLE R	SAMPLE A-CALIBRATED	SAMPLE B-CALIBRATED
NUMBER OF ATOMS 1	0.17138D+17	0.16487D+17	0.21254D+17	0.17014D+17	0.16368D+17
NUMBER OF ATOMS 2	0.17159D+17	0.16417D+17	0.21035D+17	0.17212D+17	0.16468D+17
NUMBER OF ATOMS 3	0.17273D+17	0.16407D+17	0.21292D+17	0.17117D+17	0.16259D+17
NO. OF ATOMS 1-3	0.17190D+17	0.16437D+17	0.21193D+17	0.17114D+17	0.16365D+17
RSD OF MEAN	0.24332D+00	0.15350D+00	0.37806D+00		

PLUTONIUM CONCENTRATIONS IN MICROGRAMS PLUTONIUM/G SOLUTION

C : 1ST RUN	0.94148D+01	0.90515D+01	0.86673D+01	0.93466D+01	0.89859D+01
C : 2ND RUN	0.94261D+01	0.90130D+01	0.85778D+01	0.94554D+01	0.90410D+01
C : 3RD RUN	0.94887D+01	0.90075D+01	0.86826D+01	0.94034D+01	0.89265D+01
CONCENTRATION 1-3	0.94431D+01	0.90240D+01	0.86423D+01	0.93566D+01	0.90008D+01
SIGMA	0.52794D-03	0.19187D-03	0.10676D-02		
STANDARD DEVIATION	0.22977D-01	0.13852D-01	0.32674D-01		
RSD OF MEAN	0.24332D+00	0.15350D+00	0.37806D+00		

PLUTONIUM CONCENTRATIONS WITH INCLUSION OF THE RESULTS OF ALPHA SPECTROMETRY

PU-239 CONCENTRATIONS IN ATOMS/G SOLUTION

	SAMPLE A	SAMPLE B	SAMPLE R	SAMPLE A-CALIBRATED	SAMPLE B-CALIBRATED
NUMBER OF ATOMS 1	0.17138D+17	0.16487D+17	0.21254D+17	0.17014D+17	0.16368D+17
NUMBER OF ATOMS 2	0.17159D+17	0.16417D+17	0.21035D+17	0.17212D+17	0.16468D+17
NUMBER OF ATOMS 3	0.17273D+17	0.16407D+17	0.21292D+17	0.17117D+17	0.16259D+17
NO. OF ATOMS 1-3	0.17190D+17	0.16437D+17	0.21193D+17	0.17114D+17	0.16365D+17
RSD OF MEAN	0.24332D+00	0.15350D+00	0.37806D+00		

PLUTONIUM CONCENTRATIONS IN MICROGRAMS PLUTONIUM/G SOLUTION

C : 1ST RUN	0.95144D+01	0.91479D+01	0.86676D+01	0.94454D+01	0.90815D+01
C : 2ND RUN	0.95258D+01	0.91089D+01	0.85781D+01	0.95554D+01	0.91372D+01
C : 3RD RUN	0.95891D+01	0.91034D+01	0.86829D+01	0.95028D+01	0.90215D+01
CONCENTRATION 1-3	0.95430D+01	0.91200D+01	0.86426D+01	0.94555D+01	0.90967D+01
SIGMA	0.53917D-03	0.19598D-03	0.10677D-02		
STANDARD DEVIATION	0.23220D-01	0.13999D-01	0.32676D-01		
RSD OF MEAN	0.24332D+00	0.15350D+00	0.37806D+00		

PU/U-RATIOS

	SAMPLE A	SAMPLE B	SAMPLE R
MS-MEASUREMENTS	0.80599D+01	0.80212D+01	0.79010D+01
ALPHA-MEASUREMENTS	0.81452D+01	0.81066D+01	0.79013D+01

(IF ANY OF THESE RATIOS COULD NOT BE CALCULATED,IT IS PUT = 0.)

12.2 Results of One Laboratory for the Dry Spike and Aluminium Capsule Experiments

RESULTS OF THE SUBROUTINE DRY FOR THE LAB WITH CODE NO.: 15

0.592900	0.593800	0.595300	0.594900	0.592800	0.594200	0.593700	0.591600	0.592100	0.594200	1.169430	1.401480	1
0.595200	0.595800	0.594500	0.593300	0.594700	0.593400	0.593200	0.594400	0.594600	0.594400	1.169430	1.401480	1
0.589300	0.590900	0.592600	0.594900	0.596000	0.593200	0.592900	0.598100	0.599700	0.599800	1.169430	1.401480	1
0.592000	0.592700	0.592000	0.592300	0.591200	0.591500	0.590400	0.589200	0.588100	0.587400	1.160090	1.397150	2
0.593900	0.592800	0.593300	0.590500	0.591800	0.597100	0.594100	0.594300	0.593900	0.594200	1.160090	1.397150	2
0.588600	0.587200	0.589300	0.589800	0.588900	0.590200	0.591200	0.588400	0.592900	0.588100	1.160090	1.397150	2
1.200000	1.201000	1.208000	1.197000	1.190000	1.199000	1.202000	1.197000	1.196000	1.200000	1.169430	1.401480	2
1.195000	1.198000	1.194000	1.198000	1.201000	1.199000	1.199000	1.201000	1.201000	1.198000	1.169430	1.401480	1
1.197000	1.193000	1.189000	1.194000	1.194000	1.196000	1.196000	1.200000	1.196000	1.191000	1.169430	1.401480	1
1.190000	1.184000	1.180000	1.188000	1.190000	1.192000	1.193000	1.196000	1.194000	1.192000	1.160090	1.397150	2
1.190000	1.190000	1.189000	1.191000	1.193000	1.195000	1.193000	1.192000	1.191000	1.190000	1.160090	1.397150	2
1.193000	1.194000	1.201000	1.196000	1.197000	1.194000	1.194000	1.200000	1.193000	1.190000	1.160090	1.397150	2

RUN AND LAB MEANS,VALUES OF THE DRY SPIKE EXPERIMENT
IN THE ORDER:SAMPLE 1-U233/238, SAMPLE 2-U233/238, SAMPLE 1-PU242/239, SAMPLE 2-PU242/239
VARIANCE ETC. OF SINGLE MEASUREMENTS ARE GIVEN

RUN NO.	RUN MEAN	SIGMA	SD	RSD
1	0.59365D+00	0.144D-05	0.120D-02	0.202D+00
2	0.59431D+00	0.898D-06	0.948D-03	0.159D+00
3	0.59349D+00	0.786D-05	0.280D-02	0.4720+00
1	0.59141D+00	0.130D-05	0.114D-02	0.1930+00
2	0.59307D+00	0.176D-05	0.133D-02	0.223D+00
3	0.58920D+00	0.149D-05	0.122D-02	0.207D+00
1	0.11990D+01	0.457D-05	0.214D-02	0.178D+00
2	0.11981D+01	0.641D-05	0.253D-02	0.211D+00
3	0.11949D+01	0.104D-04	0.323D-02	0.2700+00
1	0.11891D+01	0.261D-04	0.511D-02	0.4300+00
2	0.11916D+01	0.398D-05	0.200D-02	0.167D+00
3	0.11961D+01	0.898D-05	0.300D-02	0.251D+00

RESULTS OF THE STANDARD EXPERIMENT FOR COMPARISON
SAMPLE A

FOR URANIUM

NUMBER OF ATOMS 1 0.28753D+19
NUMBER OF ATOMS 2 0.29061D+19
NUMBER OF ATOMS 3 0.28833D+19

FOR PLUTONIUM

NUMBER OF ATOMS 1 0.17138D+17
NUMBER OF ATOMS 2 0.17159D+17
NUMBER OF ATOMS 3 0.17273D+17

RESULTS OF THE DRY SPIKE EXPERIMENT

	SAMPLE A-1	SAMPLE A-2
URANIUM RESULTS:		
NUMBER OF ATOMS 1	0.29038D+19	0.29006D+19
NUMBER OF ATOMS 2	0.29005D+19	0.28924D+19
NUMBER OF ATOMS 3	0.29046D+19	0.29116D+19
PLUTONIUM RESULTS:		
NUMBER OF ATOMS 1	0.17171D+17	0.17234D+17
NUMBER OF ATOMS 2	0.17184D+17	0.17196D+17
NUMBER OF ATOMS 3	0.17232D+17	0.17129D+17

CALCULATION ON THE BASIS OF THE THREE DIFFERENT ISOTOPIC RATIOS MEASURED IN THE DRY SPIKE EXPERIMENT
MEAN NUMBER OF ATOMS

FOR URANIUM:	0.29030D+19	0.29015D+19
FOR PLUTCNIUM:	0.17100D+17	0.17090D+17

CALCULATION ON THE BASIS OF THREE RESULTING NUMBERS OF ATOMS CALCULATED FOR THE DRY SPIKE EXPERIMENT
MEAN NUMBER OF ATOMS

	SAMPLE A-1	SD(MEAN)	RSD(MEAN)	SAMPLE A-2	SD(MEAN)	RSD(MEAN)
URANIUM	0.29030D+19	0.25232D-03	0.42490D-01	0.29015D+19	0.11224D-02	0.18984D+00
PLUTONIUM	0.17196D+17	0.12549D-02	0.10480D+00	0.17186D+17	0.20480D-02	0.17177D+00

RESULTS OF THE SUBROUTINE DRY FOR THE LAB WITH CODE NO.: 15 ALUMINIUM CAPSULE EXPERIMENT

0.696400	0.694600	0.695500	0.697600	0.697600	0.695800	0.694100	0.694300	0.697000	0.697800	1.128250	1.147090	1
0.698700	0.698200	0.699000	0.698300	0.701100	0.701200	0.700500	0.702300	0.695700	0.698000	1.128250	1.147090	1
0.696200	0.694300	0.694500	0.695700	0.695400	0.697800	0.695800	0.698700	0.699200	0.701100	1.128250	1.147090	1
0.687900	0.684900	0.684900	0.682600	0.684700	0.685700	0.684500	0.682000	0.682900	0.680600	1.131580	1.172000	2
0.684100	0.679600	0.683000	0.678200	0.679800	0.682000	0.684700	0.683800	0.684200	0.683200	1.131580	1.172000	2
0.682600	0.688700	0.693600	0.687100	0.687000	0.687600	0.687900	0.684400	0.685900	0.690400	1.131580	1.172000	2
1.411100	1.409200	1.408100	1.408100	1.402200	1.409000	1.408500	1.408100	1.403400	1.400900	1.128250	1.147090	1
1.387700	1.385900	1.399900	1.407000	1.401300	1.393400	1.402100	1.398100	1.395400	1.407300	1.128250	1.147090	1
1.402600	1.402400	1.403300	1.401300	1.406800	1.406600	1.408900	1.406300	1.401400	1.398200	1.128250	1.147090	1
1.376900	1.375100	1.372900	1.385100	1.382500	1.389800	1.385700	1.386400	1.390500	1.388000	1.131580	1.172000	2
1.389300	1.395100	1.382800	1.383400	1.389400	1.387300	1.386500	1.387200	1.393800	1.389600	1.131580	1.172000	2
1.393100	1.389000	1.384700	1.373500	1.380000	1.384300	1.370800	1.381400	1.385300	1.383600	1.131580	1.172000	2

RUN AND LAB MEANS,VALUES OF THE DRY SPIKE EXPERIMENT
IN THE ORDER:SAMPLE 1-U233/238, SAMPLE 2-U233/238, SAMPLE 1-PU242/239, SAMPLE 2-PU242/239
VARIANCE ETC. OF SINGLE MEASUREMENTS ARE GIVEN

RUN NO.	RUN MEAN	SIGMA	SD	RSD
1	0.69574D+00	0.193D-05	0.139D-02	0.199D+00
2	0.69991D+00	0.242D-05	0.156D-02	0.222D+00
3	0.69605D+00	0.231D-05	0.152D-02	0.218D+00
1	0.68465D+00	0.329D-05	0.181D-02	0.265D+00
2	0.68190D+00	0.584D-05	0.242D-02	0.354D+00
3	0.68736D+00	0.104D-04	0.322D-02	0.469D+00
1	0.14080D+01	0.657D-05	0.256D-02	0.182D+00
2	0.13969D+01	0.538D-04	0.734D-02	0.525D+00
3	0.14048D+01	0.734D-05	0.271D-02	0.193D+00
1	0.13818D+01	0.371D-04	0.609D-02	0.441D+00
2	0.13876D+01	0.149D-04	0.386D-02	0.278D+00
3	0.13821D+01	0.553D-04	0.743D-02	0.538D+00

RESULTS OF THE STANDARD EXPERIMENT FOR COMPARISON
SAMPLE A

FOR URANIUM

NUMBER OF ATOMS 1 0.28753D+19
NUMBER OF ATOMS 2 0.29061D+19
NUMBER OF ATOMS 3 0.28833D+19

FOR PLUTONIUM

NUMBER OF ATOMS 1 0.17138D+17
NUMBER OF ATOMS 2 0.17159D+17
NUMBER OF ATOMS 3 0.17273D+17

RESULTS OF THE DRY SPIKE EXPERIMENT

	SAMPLE A-1	SAMPLE A-2
URANIUM RESULTS:		
NUMBER OF ATOMS 1	0.29140D+19	0.29075D+19
NUMBER OF ATOMS 2	0.28963D+19	0.29194D+19
NUMBER OF ATOMS 3	0.29127D+19	0.28959D+19
PLUTONIUM RESULTS:		
NUMBER OF ATOMS 1	0.17136D+17	0.17153D+17
NUMBER OF ATOMS 2	0.17278D+17	0.17078D+17
NUMBER OF ATOMS 3	0.17178D+17	0.17149D+17

CALCULATION ON THE BASIS OF THE THREE DIFFERENT ISOTOPIC RATIOS MEASURED IN THE DRY SPIKE EXPERIMENT
MEAN NUMBER OF ATOMS

FOR URANIUM:	0.29076D+19	0.29076D+19
FOR PLUTONIUM:	0.17160D+17	0.17084D+17

CALCULATION ON THE BASIS OF THREE RESULTING NUMBERS OF ATOMS CALCULATED FOR THE DRY SPIKE EXPERIMENT
MEAN NUMBER OF ATOMS

	SAMPLE A-1	SD(MEAN)	RSD(MEAN)	SAMPLE A-2	SD(MEAN)	RSD(MEAN)
URANIUM	0.29077D+19	0.13426D-02	0.19256D+00	0.29076D+19	0.15769D-02	0.23033D+00
PLUTONIUM	0.17197D+17	0.32978D-02	0.23501D+00	0.17127D+17	0.18936D-02	0.13684D+00

12.3 Results of the Group of Laboratories

RESULTS OF LAB2 FOR ALL THE LABS

LAB	MEAN	VARIANCE LAB MEAN	STAND.DEV. LAB MEAN	RSD(%) LAB MEAN	VARIANCE RUN	SD RUN	RSD(%) RUN	VARIANCE SCAN	SD SCAN	RSD(%) SCAN
RATIO 83 SAMPLE US										
LAB 2	0.2241D-01	0.1509D-07	0.123D-03	0.548D+00	0.4299D-07	0.207D-03	0.925D+00	0.1823D-07	0.135D-03	0.602D+00
LAB 3	0.2251D-01	0.2710D-09	0.165D-04	0.731D-01	-.1151D-08	-.500D+01	-.500D+01	0.1571D-07	0.125D-03	0.557D+00
LAB 4	0.2194D-01	0.2257D-09	0.150D-04	0.685D-01	-.1272D-08	-.500D+01	-.500D+01	0.1560D-07	0.125D-03	0.569D+00
LAB 5	0.2572D-01	0.1081D-06	0.329D-03	0.128D+01	0.2961D-06	0.544D-03	0.212D+01	0.2256D-06	0.475D-03	0.185D+01
LAB 6	0.2212D-01	0.1151D-08	0.339D-04	0.153D+00	0.1828D-08	0.428D-04	0.193D+00	0.1301D-07	0.114D-03	0.516D+00
LAB 7	0.2214D-01	0.1736D-10	0.417D-05	0.188D-01	-.6004D-08	-.500D+01	-.500D+01	0.4845D-07	0.220D-03	0.994D+00
LAB 8	0.2361D-01	0.1355D-06	0.368D-03	0.156D+01	0.3239D-06	0.569D-03	0.241D+01	0.6615D-06	0.813D-03	0.345D+01
LAB 10	0.2166D-01	0.1273D-07	0.113D-03	0.521D+00	0.3598D-07	0.190D-03	0.876D+00	0.1757D-07	0.133D-03	0.612D+00
LAB 12	0.2233D-01	0.1297D-08	0.360D-04	0.161D+00	-.3136D-08	-.500D+01	-.500D+01	0.5622D-07	0.237D-03	0.106D+01
LAB 13	0.2199D-01	0.1260D-08	0.355D-04	0.161D+00	-.9587D-08	-.500D+01	-.500D+01	0.1069D-06	0.327D-03	0.149D+01
LAB 14	0.2217D-01	0.5208D-10	0.722D-05	0.325D-01	-.4539D-09	-.500D+01	-.500D+01	0.4881D-08	0.699D-04	0.315D+00
LAB 15	0.2189D-01	0.3804D-08	0.617D-04	0.282D+00	0.6785D-08	0.824D-04	0.376D+00	0.3701D-07	0.192D-03	0.879D+00
LAB 16	0.2212D-01	0.2552D-10	0.505D-05	0.228D-01	-.1891D-09	-.500D+01	-.500D+01	0.2125D-08	0.461D-04	0.208D+00
LAB 17	0.2228D-01	0.1554D-08	0.394D-04	0.177D+00	0.7872D-09	0.281D-04	0.126D+00	0.3099D-07	0.176D-03	0.790D+00
LAB 18	0.2199D-01	0.5406D-08	0.735D-04	0.334D+00	0.1387D-07	0.118D-03	0.535D+00	0.1881D-07	0.137D-03	0.624D+00
LAB 19	0.2230D-01	0.3028D-09	0.174D-04	0.780D-01	0.1426D-09	0.119D-04	0.536D-01	0.6126D-08	0.783D-04	0.351D+00
LAB 20	0.2486D-01	0.0	0.0	0.0	-.5000D+01	-.500D+01	-.500D+01	0.2995D-06	0.547D-03	0.220D+01
LAB 21	0.2308D-01	0.8629D-09	0.294D-04	0.127D+00	0.1374D-08	0.371D-04	0.161D+00	0.2813D-08	0.530D-04	0.230D+00
LAB 23	0.2201D-01	0.2189D-07	0.148D-03	0.672D+00	0.6016D-07	0.245D-03	0.111D+01	0.4417D-07	0.210D-03	0.955D+00
RATIO 38 SAMPLE AU										
LAB 2	0.8221D-06	0.2640D-13	0.162D-06	0.198D+02	0.6334D-13	0.252D-06	0.306D+02	0.1268D-12	0.356D-06	0.433D+02
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 8	0.6750D-04	0.1396D-09	0.118D-04	0.175D+02	0.3905D-09	0.198D-04	0.293D+02	0.2262D-09	0.150D-04	0.223D+02
LAB 10	0.2208D-05	0.1736D-12	0.417D-06	0.189D+02	0.2731D-12	0.523D-06	0.237D+02	0.1982D-11	0.141D-05	0.638D+02
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 38 SAMPLE BU										
LAB 2	0.1201D-05	0.2194D-12	0.468D-06	0.390D+02	0.6332D-12	0.796D-06	0.663D+02	0.1989D-12	0.446D-06	0.371D+02
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 8	0.7458D-04	0.1960D-09	0.140D-04	0.188D+02	0.4607D-09	0.215D-04	0.288D+02	0.1018D-08	0.319D-04	0.428D+02
LAB 10	0.2250D-05	0.8802D-12	0.938D-06	0.417D+02	0.2532D-11	0.159D-05	0.707D+02	0.8690D-12	0.932D-06	0.414D+02
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 38 SAMPLE RU										
LAB 2	0.5519D-06	0.1410D-15	0.119D-07	0.215D+01	-.2788D-12	-.500D+01	-.500D+01	0.2232D-11	0.149D-05	0.271D+03
LAB 3	0.3771D-04	0.6387D-11	0.253D-05	0.670D+01	0.1662D-10	0.408D-05	0.108D+02	0.2030D-10	0.451D-05	0.119D+02

LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 8	0.9542D-04	0.7413D-10	0.861D-05	0.902D+01	0.2138D-09	0.146D-04	0.153D+02	0.6845D-10	0.827D-05	0.867D+01
LAB 10	0.2333D-05	0.1372D-12	0.370D-06	0.159D+02	0.2403D-12	0.490D-06	0.210D+02	0.1369D-11	0.117D-05	0.501D+02
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 38 SAMPLE AS										
LAB 2	0.6368D+00	0.1303D-05	0.114D-02	0.179D+00	0.3525D-05	0.188D-02	0.295D+00	0.3064D-05	0.175D-02	0.275D+00
LAB 3	0.6322D+00	0.6518D-06	0.807D-03	0.128D+00	0.1866D-05	0.137D-02	0.216D+00	0.7127D-06	0.844D-03	0.134D+00
LAB 4	0.6416D+00	0.3836D-04	0.619D-02	0.965D+00	0.1014D-03	0.101D-01	0.157D+01	0.1094D-03	0.105D-01	0.163D+01
LAB 5	0.6476D+00	0.4837D-09	0.220D-04	0.340D-02	-.4855D-06	-.500D+01	-.500D+01	0.3896D-05	0.197D-02	0.305D+00
LAB 6	0.6395D+00	0.3063D-05	0.175D-02	0.274D+00	0.7861D-05	0.280D-02	0.438D+00	0.1062D-04	0.326D-02	0.510D+00
LAB 7	0.6379D+00	0.6730D-06	0.820D-03	0.129D+00	-.1273D-04	-.500D+01	-.500D+01	0.1180D-03	0.109D-01	0.170D+01
LAB 8	0.6392D+00	0.1357D-04	0.368D-02	0.576D+00	0.3331D-04	0.577D-02	0.903D+00	0.5935D-04	0.770D-02	0.121D+01
LAB 10	0.6368D+00	0.4060D-05	0.202D-02	0.316D+00	0.1204D-04	0.347D-02	0.545D+00	0.1113D-05	0.105D-02	0.166D+00
LAB 12	0.6376D+00	0.6480D-06	0.805D-03	0.126D+00	0.1595D-05	0.126D-02	0.198D+00	0.2789D-05	0.167D-02	0.262D+00
LAB 13	0.6446D+00	0.3458D-07	0.186D-03	0.288D-01	-.1260D-06	-.500D+01	-.500D+01	0.1838D-05	0.136D-02	0.210D+00
LAB 14	0.6414D+00	0.1608D-05	0.127D-02	0.198D+00	0.3737D-05	0.193D-02	0.301D+00	0.8710D-05	0.295D-02	0.460D+00
LAB 15	0.6454D+00	0.4102D-05	0.203D-02	0.314D+00	0.1169D-04	0.342D-02	0.530D+00	0.4969D-05	0.223D-02	0.345D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.6339D+00	0.5243D-05	0.229D-02	0.361D+00	0.1361D-04	0.369D-02	0.582D+00	0.1695D-04	0.412D-02	0.650D+00
LAB 18	0.6420D+00	0.4141D-05	0.203D-02	0.317D+00	0.1018D-04	0.319D-02	0.497D+00	0.1794D-04	0.424D-02	0.660D+00
LAB 19	0.6416D+00	0.2556D-06	0.506D-03	0.788D-01	0.4892D-06	0.699D-03	0.109D+00	0.2222D-05	0.149D-02	0.232D+00
LAB 20	0.6373D+00	0.2280D-06	0.477D-03	0.749D-01	-.9661D-05	-.500D+01	-.500D+01	0.8276D-04	0.910D-02	0.143D+01
LAB 21	0.6300D+00	0.6391D-07	0.253D-03	0.401D-01	-.3877D-06	-.500D+01	-.500D+01	0.4636D-05	0.215D-02	0.342D+00
LAB 23	0.6519D+00	0.4376D-06	0.661D-03	0.101D+00	0.5215D-06	0.722D-03	0.111D+00	0.6329D-05	0.252D-02	0.386D+00
RATIO 38 SAMPLE BS										
LAB 2	0.6309D+00	0.5116D-05	0.226D-02	0.359D+00	0.1479D-04	0.385D-02	0.610D+00	0.4427D-05	0.210D-02	0.334D+00
LAB 3	0.6235D+00	0.1126D-06	0.336D-03	0.538D-01	-.1552D-05	-.500D+01	-.500D+01	0.1512D-04	0.389D-02	0.624D+00
LAB 4	0.6326D+00	0.3139D-05	0.177D-02	0.280D+00	0.4815D-05	0.219D-02	0.347D+00	0.3683D-04	0.607D-02	0.959D+00
LAB 5	0.6408D+00	0.8678D-07	0.295D-03	0.460D-01	-.1203D-06	-.500D+01	-.500D+01	0.3045D-05	0.175D-02	0.272D+00
LAB 6	0.6331D+00	0.1511D-05	0.123D-02	0.194D+00	-.9353D-06	-.500D+01	-.500D+01	0.4375D-04	0.661D-02	0.104D+01
LAB 7	0.6248D+00	0.1960D-05	0.140D-02	0.224D+00	-.3335D-04	-.500D+01	-.500D+01	0.3139D-03	0.177D-01	0.284D+01
LAB 8	0.6340D+00	0.2357D-04	0.486D-02	0.766D+00	0.5108D-04	0.715D-02	0.113D+01	0.1571D-03	0.125D-01	0.198D+01
LAB 10	0.6322D+00	0.1182D-05	0.109D-02	0.172D+00	0.3388D-05	0.184D-02	0.291D+00	0.1265D-05	0.112D-02	0.178D+00
LAB 12	0.6335D+00	0.5008D-06	0.708D-03	0.112D+00	0.4450D-06	0.667D-03	0.105D+00	0.8460D-05	0.291D-02	0.459D+00
LAB 13	0.6352D+00	0.4574D-07	0.214D-03	0.337D-01	-.1407D-06	-.500D+01	-.500D+01	0.2224D-05	0.149D-02	0.235D+00
LAB 14	0.6299D+00	0.1783D-05	0.134D-02	0.212D+00	0.4559D-05	0.214D-02	0.339D+00	0.6334D-05	0.252D-02	0.400D+00
LAB 15	0.6337D+00	0.3396D-05	0.184D-02	0.291D+00	0.8381D-05	0.289D-02	0.457D+00	0.1445D-04	0.380D-02	0.600D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.6315D+00	0.4961D-06	0.704D-03	0.112D+00	0.1206D-05	0.110D-02	0.174D+00	0.2259D-05	0.150D-02	0.238D+00
LAB 18	0.6306D+00	0.1074D-05	0.104D-02	0.164D+00	0.1936D-05	0.139D-02	0.221D+00	0.1029D-04	0.321D-02	0.509D+00
LAB 19	0.6348D+00	0.6834D-06	0.827D-03	0.130D+00	0.1467D-05	0.121D-02	0.191D+00	0.4663D-05	0.216D-02	0.340D+00
LAB 20	0.6327D+00	0.1782D-05	0.134D-02	0.211D+00	-.5735D-05	-.500D+01	-.500D+01	0.8866D-04	0.942D-02	0.149D+01
LAB 21	0.6261D+00	0.3821D-06	0.618D-03	0.987D-01	0.9631D-06	0.981D-03	0.157D+00	0.1466D-05	0.121D-02	0.193D+00
LAB 23	0.6472D+00	0.1591D-05	0.126D-02	0.195D+00	0.3902D-05	0.198D-02	0.305D+00	0.6976D-05	0.264D-02	0.408D+00
RATIO 38 SAMPLE RS										
LAB 2	0.7540D+00	0.1898D-07	0.138D-03	0.183D-01	-.2641D-06	-.500D+01	-.500D+01	0.2569D-05	0.160D-02	0.213D+00
LAB 3	0.7432D+00	0.3309D-07	0.182D-03	0.245D-01	-.4315D-06	-.500D+01	-.500D+01	0.4246D-05	0.206D-02	0.277D+00
LAB 4	0.7542D+00	0.4634D-05	0.215D-02	0.285D+00	0.7196D-06	0.848D-03	0.112D+00	0.1055D-03	0.103D-01	0.136D+01
LAB 5	0.7624D+00	0.4260D-06	0.653D-03	0.856D-01	0.7260D-06	0.852D-03	0.112D+00	0.4417D-05	0.210D-02	0.276D+00
LAB 6	0.7499D+00	0.1450D-05	0.120D-02	0.161D+00	0.6827D-06	0.826D-03	0.110D+00	0.2933D-04	0.542D-02	0.722D+00
LAB 7	0.7541D+00	0.2382D-05	0.154D-02	0.205D+00	0.1509D-05	0.123D-02	0.163D+00	0.4509D-04	0.671D-02	0.890D+00
LAB 8	0.7595D+00	0.1161D-05	0.108D-02	0.142D+00	-.9267D-05	-.500D+01	-.500D+01	0.1020D-03	0.101D-01	0.133D+01
LAB 10	0.7519D+00	0.7474D-05	0.273D-02	0.364D+00	0.2155D-04	0.464D-02	0.617D+00	0.6949D-05	0.264D-02	0.351D+00

LAB 12	0.7511D+00	0.1197D-05	0.109D-02	0.146D+00	0.2647D-05	0.163D-02	0.217D+00	0.7555D-05	0.275D-02	0.366D+00
LAB 13	0.7550D+00	0.1074D-06	0.328D-03	0.434D-01	-.2069D-06	-.500D+01	-.500D+01	0.4233D-05	0.206D-02	0.273D+00
LAB 14	0.7500D+00	0.6859D-07	0.262D-03	0.349D-01	-.5359D-06	-.500D+01	-.500D+01	0.5934D-05	0.244D-02	0.325D+00
LAB 15	0.7605D+00	0.1273D-05	0.113D-02	0.148D+00	0.3229D-05	0.180D-02	0.236D+00	0.4708D-05	0.217D-02	0.285D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.7544D+00	0.6034D-06	0.777D-03	0.103D+00	0.1181D-05	0.109D-02	0.144D+00	0.5032D-05	0.224D-02	0.297D+00
LAB 18	0.7581D+00	0.2565D-05	0.160D-02	0.211D+00	0.6681D-05	0.258D-02	0.341D+00	0.8116D-05	0.285D-02	0.376D+00
LAB 19	0.7540D+00	0.5554D-06	0.745D-03	0.988D-01	0.8187D-06	0.905D-03	0.120D+00	0.6779D-05	0.260D-02	0.345D+00
LAB 20	0.7536D+00	0.1268D-05	0.113D-02	0.149D+00	-.1029D-04	-.500D+01	-.500D+01	0.1127D-03	0.106D-01	0.141D+01
LAB 21	0.7399D+00	0.3710D-07	0.193D-03	0.260D-01	-.6572D-06	-.500D+01	-.500D+01	0.6148D-05	0.248D-02	0.335D+00
LAB 23	0.7558D+00	0.2816D-05	0.168D-02	0.222D+00	0.7136D-05	0.267D-02	0.353D+00	0.1050D-04	0.324D-02	0.429D+00
RATIO 48 SAMPLE AU										
LAB 2	0.1659D-03	0.3872D-12	0.622D-06	0.375D+00	-.1005D-10	-.500D+01	-.500D+01	0.8968D-10	0.947D-05	0.571D+01
LAB 3	0.1780D-03	0.2146D-11	0.146D-05	0.823D+00	0.2027D-11	0.142D-05	0.800D+00	0.3529D-10	0.594D-05	0.334D+01
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.2537D-03	0.8473D-09	0.291D-04	0.115D+02	0.2431D-08	0.493D-04	0.194D+02	0.8893D-09	0.298D-04	0.118D+02
LAB 6	0.1710D-03	0.1901D-10	0.436D-05	0.255D+01	0.3919D-10	0.626D-05	0.366D+01	0.1426D-09	0.119D-04	0.699D+01
LAB 7	0.1387D-03	0.4115D-10	0.641D-05	0.462D+01	0.8601D-10	0.927D-05	0.668D+01	0.2994D-09	0.173D-04	0.125D+02
LAB 8	0.1933D-03	0.1892D-10	0.435D-05	0.225D+01	-.4338D-10	-.500D+01	-.500D+01	0.8012D-09	0.283D-04	0.146D+02
LAB 10	0.1658D-03	0.1835D-11	0.135D-05	0.817D+00	0.1168D-12	0.342D-06	0.206D+00	0.4311D-10	0.657D-05	0.396D+01
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.1844D-03	0.7525D-10	0.867D-05	0.471D+01	0.2072D-09	0.144D-04	0.781D+01	0.1482D-09	0.122D-04	0.660D+01
LAB 14	0.2000D-03	0.0	0.0	0.0	-.4100D-40	-.500D+01	-.500D+01	0.3280D-39	0.181D-19	0.906D-14
LAB 15	0.1700D-03	0.9705D-12	0.985D-06	0.579D+00	-.1079D-10	-.500D+01	-.500D+01	0.1096D-09	0.105D-04	0.616D+01
LAB 16	0.1829D-03	0.9028D-11	0.300D-05	0.164D+01	0.2076D-10	0.456D-05	0.249D+01	0.5060D-10	0.711D-05	0.389D+01
LAB 17	0.1579D-03	0.2569D-10	0.507D-05	0.321D+01	0.7374D-10	0.859D-05	0.544D+01	0.2679D-10	0.518D-05	0.328D+01
LAB 18	0.1936D-03	0.1055D-10	0.325D-05	0.168D+01	0.8723D-11	0.295D-05	0.153D+01	0.1833D-09	0.135D-04	0.700D+01
LAB 19	0.1754D-03	0.1336D-10	0.366D-05	0.208D+01	0.3937D-10	0.627D-05	0.358D+01	0.5738D-11	0.240D-05	0.137D+01
LAB 20	0.1517D-03	0.5897D-10	0.768D-05	0.506D+01	0.1747D-09	0.132D-04	0.872D+01	0.1758D-10	0.419D-05	0.276D+01
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 48 SAMPLE BU										
LAB 2	0.1696D-03	0.3536D-11	0.188D-05	0.111D+01	0.2884D-11	0.170D-05	0.100D+01	0.6180D-10	0.786D-05	0.463D+01
LAB 3	0.1740D-03	0.3667D-10	0.606D-05	0.348D+01	0.1097D-09	0.105D-04	0.602D+01	0.2411D-11	0.155D-05	0.893D+00
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.1996D-03	0.0	0.0	0.0	-.5904D-40	-.500D+01	-.500D+01	0.4723D-39	0.217D-19	0.109D-13
LAB 6	0.1640D-03	0.1332D-10	0.365D-05	0.223D+01	0.1598D-10	0.400D-05	0.244D+01	0.1919D-09	0.139D-04	0.845D+01
LAB 7	0.1533D-03	0.2726D-10	0.522D-05	0.340D+01	0.5186D-10	0.720D-05	0.470D+01	0.2393D-09	0.155D-04	0.101D+02
LAB 8	0.1850D-03	0.1563D-11	0.125D-05	0.676D+00	-.5677D-10	-.500D+01	-.500D+01	0.4917D-09	0.222D-04	0.120D+02
LAB 10	0.1657D-03	0.5220D-11	0.228D-05	0.138D+01	0.8217D-11	0.287D-05	0.173D+01	0.5956D-10	0.772D-05	0.466D+01
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.1989D-03	0.5106D-10	0.715D-05	0.359D+01	0.1266D-09	0.113D-04	0.566D+01	0.2127D-09	0.146D-04	0.733D+01
LAB 14	0.1633D-03	0.1215D-11	0.110D-05	0.675D+00	0.8185D-12	0.905D-06	0.554D+00	0.2262D-10	0.476D-05	0.291D+01
LAB 15	0.1790D-03	0.4189D-11	0.205D-05	0.114D+01	-.1305D-10	-.500D+01	-.500D+01	0.2049D-09	0.143D-04	0.800D+01
LAB 16	0.1658D-03	0.2257D-11	0.150D-05	0.906D+00	-.5580D-11	-.500D+01	-.500D+01	0.9881D-10	0.994D-05	0.599D+01
LAB 17	0.1621D-03	0.5382D-11	0.232D-05	0.143D+01	0.1176D-10	0.343D-05	0.212D+01	0.3512D-10	0.593D-05	0.366D+01
LAB 18	0.1794D-03	0.1588D-09	0.126D-04	0.702D+01	0.4668D-09	0.216D-04	0.120D+02	0.7563D-10	0.870D-05	0.485D+01
LAB 19	0.1710D-03	0.5641D-11	0.238D-05	0.139D+01	0.1447D-10	0.380D-05	0.222D+01	0.1958D-10	0.443D-05	0.259D+01
LAB 20	0.1380D-03	0.8211D-10	0.906D-05	0.657D+01	0.2448D-09	0.156D-04	0.113D+02	0.1227D-10	0.350D-05	0.254D+01
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 48 SAMPLE RU										
LAB 2	0.5932D-04	0.8368D-12	0.915D-06	0.154D+01	-.5177D-12	-.500D+01	-.500D+01	0.2422D-10	0.492D-05	0.830D+01
LAB 3	0.6683D-04	0.1604D-10	0.401D-05	0.599D+01	0.4544D-10	0.674D-05	0.101D+02	0.2149D-10	0.464D-05	0.694D+01
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.9980D-04	0.9184D-40	0.958D-20	0.960D-14	0.1952D-39	0.140D-19	0.140D-13	0.6428D-39	0.254D-19	0.254D-13
LAB 6	0.6670D-04	0.2127D-11	0.146D-05	0.219D+01	-.2122D-11	-.500D+01	-.500D+01	0.6803D-10	0.825D-05	0.124D+02
LAB 7	0.3500D-04	0.9896D-11	0.315D-05	0.899D+01	0.2537D-10	0.504D-05	0.144D+02	0.3452D-10	0.588D-05	0.168D+02
LAB 8	0.5625D-04	0.3646D-11	0.191D-05	0.339D+01	-.9226D-11	-.500D+01	-.500D+01	0.1613D-09	0.127D-04	0.226D+02
LAB 10	0.5267D-04	0.6476D-12	0.805D-06	0.153D+01	0.1394D-11	0.118D-05	0.224D+01	0.4393D-11	0.210D-05	0.398D+01
LAB 12	0.5567D-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.5083D-04	0.6944D-12	0.833D-06	0.164D+01	0.1190D-11	0.109D-05	0.215D+01	0.7143D-11	0.267D-05	0.526D+01
LAB 15	0.6842D-04	0.9003D-10	0.949D-05	0.139D+02	0.2593D-09	0.161D-04	0.235D+02	0.8677D-10	0.932D-05	0.136D+02
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.5162D-04	0.2172D-11	0.147D-05	0.285D+01	0.4031D-11	0.201D-05	0.389D+01	0.1987D-10	0.446D-05	0.864D+01

LAB 18	0.3920D-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.5936D-04	0.5146D-13	0.227D-06	0.382D+00	-.1025D-11	-.500D+01	-.500D+01	0.9433D-11	0.307D-05	0.517D+01
LAB 20	0.4871D-04	0.8939D-11	0.299D-05	0.614D+01	0.2650D-10	0.515D-05	0.106D+02	0.2565D-11	0.160D-05	0.329D+01
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 48 SAMPLE AS										
LAB 2	0.2894D-03	0.5389D-12	0.734D-06	0.254D+00	-.3059D-12	-.500D+01	-.500D+01	0.1538D-10	0.392D-05	0.136D+01
LAB 3	0.3119D-03	0.2031D-09	0.143D-04	0.457D+01	0.5957D-09	0.244D-04	0.782D+01	0.1091D-09	0.104D-04	0.335D+01
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.3160D-03	0.2767D-09	0.166D-04	0.526D+01	0.7115D-09	0.267D-04	0.844D+01	0.9486D-09	0.308D-04	0.975D+01
LAB 6	0.2790D-03	0.2307D-09	0.152D-04	0.544D+01	0.6389D-09	0.253D-04	0.906D+01	0.4257D-09	0.206D-04	0.740D+01
LAB 7	0.1971D-03	0.2929D-09	0.171D-04	0.868D+01	0.7058D-09	0.266D-04	0.135D+02	0.1383D-08	0.372D-04	0.189D+02
LAB 8	0.2708D-03	0.2778D-09	0.167D-04	0.615D+01	0.6176D-09	0.249D-04	0.918D+01	0.1726D-08	0.415D-04	0.153D+02
LAB 10	0.2934D-03	0.4676D-10	0.684D-05	0.233D+01	0.1261D-09	0.112D-04	0.383D+01	0.1132D-09	0.106D-04	0.363D+01
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.2923D-03	0.8642D-10	0.930D-05	0.318D+01	0.2010D-09	0.142D-04	0.485D+01	0.4657D-09	0.216D-04	0.738D+01
LAB 14	0.2879D-03	0.8507D-11	0.292D-05	0.101D+01	0.2321D-10	0.482D-05	0.167D+01	0.1845D-10	0.430D-05	0.149D+01
LAB 15	0.3305D-03	0.1562D-08	0.395D-04	0.120D+02	0.4609D-08	0.679D-04	0.205D+02	0.6193D-09	0.249D-04	0.753D+01
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.2825D-03	0.2099D-09	0.145D-04	0.513D+01	0.5679D-09	0.238D-04	0.844D+01	0.4940D-09	0.222D-04	0.787D+01
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.3540D-03	0.7830D-09	0.280D-04	0.790D+01	0.2342D-08	0.484D-04	0.137D+02	0.5758D-10	0.759D-05	0.214D+01
LAB 20	0.2550D-03	0.6123D-08	0.783D-04	0.307D+02	0.1834D-07	0.135D-03	0.531D+02	0.2798D-09	0.167D-04	0.656D+01
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 48 SAMPLE BS										
LAB 2	0.2997D-03	0.6978D-10	0.835D-05	0.279D+01	0.1257D-09	0.114D-04	0.380D+01	0.6371D-09	0.252D-04	0.842D+01
LAB 3	0.3318D-03	0.1482D-08	0.385D-04	0.116D+02	0.4427D-08	0.665D-04	0.201D+02	0.1610D-09	0.127D-04	0.382D+01
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.3327D-03	0.1107D-08	0.333D-04	0.100D+02	0.3320D-08	0.576D-04	0.173D+02	0.0	0.0	0.0
LAB 6	0.2761D-03	0.7971D-12	0.893D-06	0.323D+00	-.7766D-10	-.500D+01	-.500D+01	0.6404D-09	0.253D-04	0.917D+01
LAB 7	0.2246D-03	0.1231D-09	0.111D-04	0.494D+01	0.2616D-09	0.162D-04	0.720D+01	0.8613D-09	0.293D-04	0.131D+02
LAB 8	0.3000D-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 10	0.2992D-03	0.1792D-10	0.423D-05	0.141D+01	0.2132D-10	0.462D-05	0.154D+01	0.2595D-09	0.161D-04	0.538D+01
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.2904D-03	0.1336D-09	0.116D-04	0.398D+01	0.3797D-09	0.195D-04	0.671D+01	0.1682D-09	0.130D-04	0.447D+01
LAB 14	0.2854D-03	0.6944D-12	0.833D-06	0.292D+00	-.1265D-11	-.500D+01	-.500D+01	0.2679D-10	0.518D-05	0.181D+01
LAB 15	0.3051D-03	0.1316D-09	0.115D-04	0.376D+01	0.3620D-09	0.190D-04	0.624D+01	0.2626D-09	0.162D-04	0.531D+01
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.2900D-03	0.9896D-11	0.315D-05	0.108D+01	0.1109D-10	0.333D-05	0.115D+01	0.1488D-09	0.122D-04	0.421D+01
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.3823D-03	0.7592D-09	0.276D-04	0.721D+01	0.2273D-08	0.477D-04	0.125D+02	0.3743D-10	0.612D-05	0.160D+01
LAB 20	0.3944D-03	0.5347D-08	0.731D-04	0.185D+02	-.1086D-05	-.500D+01	-.500D+01	0.8774D-05	0.296D-02	0.751D+03
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 48 SAMPLE RS										
LAB 2	0.1999D-03	0.4715D-13	0.217D-06	0.109D+00	-.2783D-12	-.500D+01	-.500D+01	0.3358D-11	0.183D-05	0.916D+00
LAB 3	0.1891D-03	0.2934D-10	0.542D-05	0.286D+01	0.8238D-10	0.908D-05	0.480D+01	0.4504D-10	0.671D-05	0.355D+01
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.2287D-03	0.2248D-09	0.150D-04	0.656D+01	0.4447D-09	0.211D-04	0.922D+01	0.1838D-08	0.429D-04	0.187D+02
LAB 6	0.2072D-03	0.4372D-10	0.661D-05	0.319D+01	0.5343D-10	0.731D-05	0.353D+01	0.6218D-09	0.249D-04	0.120D+02
LAB 7	0.1012D-03	0.2453D-09	0.157D-04	0.155D+02	0.5914D-09	0.243D-04	0.240D+02	0.1157D-08	0.340D-04	0.336D+02
LAB 8	0.2083D-03	0.6944D-10	0.833D-05	0.400D+01	0.1190D-09	0.109D-04	0.524D+01	0.7143D-09	0.267D-04	0.128D+02
LAB 10	0.2047D-03	0.1023D-11	0.101D-05	0.494D+00	-.6836D-11	-.500D+01	-.500D+01	0.7923D-10	0.890D-05	0.435D+01
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.2020D-03	0.5252D-10	0.725D-05	0.359D+01	0.1354D-09	0.116D-04	0.576D+01	0.1769D-09	0.133D-04	0.659D+01
LAB 14	0.2037D-03	0.2353D-39	0.153D-19	0.753D-14	-.3348D-11	-.500D+01	-.500D+01	0.2679D-10	0.518D-05	0.254D+01
LAB 15	0.2405D-03	0.9640D-09	0.310D-04	0.129D+02	0.2879D-08	0.537D-04	0.223D+02	0.1062D-09	0.103D-04	0.428D+01
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.1871D-03	0.5382D-11	0.232D-05	0.124D+01	0.6399D-11	0.253D-05	0.135D+01	0.7798D-10	0.883D-05	0.472D+01
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 20	0.2205D-03	0.5803D-08	0.762D-04	0.346D+02	0.1739D-07	0.132D-03	0.598D+02	0.1220D-09	0.110D-04	0.501D+01
LAB 21	0.2082D-03	0.2438D-10	0.494D-05	0.237D+01	0.6995D-10	0.836D-05	0.402D+01	0.2542D-10	0.504D-05	0.242D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 58 SAMPLE AU										

LAB 2	0.2218D-01	0.5658D-09	0.238D-04	0.107D+00	-.2413D-08	-.500D+01	-.500D+01	0.3288D-07	0.181D-03	0.817D+00
LAB 3	0.2235D-01	0.2486D-09	0.158D-04	0.705D-01	-.5083D-09	-.500D+01	-.500D+01	0.1003D-07	0.100D-03	0.448D+00
LAB 4	0.2237D-01	0.1595D-07	0.126D-03	0.565D+00	0.3746D-07	0.194D-03	0.865D+00	0.8321D-07	0.288D-03	0.129D+01
LAB 5	0.2253D-01	0.3138D-07	0.177D-03	0.786D+00	0.9105D-07	0.302D-03	0.134D+01	0.2481D-07	0.158D-03	0.699D+00
LAB 6	0.2237D-01	0.2756D-09	0.166D-04	0.742D-01	-.8089D-09	-.500D+01	-.500D+01	0.1309D-07	0.114D-03	0.511D+00
LAB 7	0.2201D-01	0.1580D-08	0.397D-04	0.181D+00	-.5275D-08	-.500D+01	-.500D+01	0.8012D-07	0.283D-03	0.129D+01
LAB 8	0.2263D-01	0.1304D-07	0.114D-03	0.504D+00	0.2038D-07	0.143D-03	0.631D+00	0.1499D-06	0.387D-03	0.171D+01
LAB 10	0.2211D-01	0.2685D-08	0.518D-04	0.234D+00	0.5317D-08	0.729D-04	0.330D+00	0.2190D-07	0.148D-03	0.669D+00
LAB 12	0.2226D-01	0.7043D-09	0.265D-04	0.119D+00	-.1955D-08	-.500D+01	-.500D+01	0.3255D-07	0.180D-03	0.810D+00
LAB 13	0.2222D-01	0.6106D-09	0.247D-04	0.111D+00	-.3539D-09	-.500D+01	-.500D+01	0.1748D-07	0.132D-03	0.595D+00
LAB 14	0.2213D-01	0.1319D-08	0.363D-04	0.164D+00	0.3088D-08	0.556D-04	0.251D+00	0.6964D-08	0.835D-04	0.377D+00
LAB 15	0.2239D-01	0.3403D-08	0.583D-04	0.261D+00	0.3095D-08	0.556D-04	0.248D+00	0.5690D-07	0.239D-03	0.107D+01
LAB 16	0.2231D-01	0.2708D-08	0.520D-04	0.233D+00	0.6004D-08	0.775D-04	0.347D+00	0.1696D-07	0.130D-03	0.584D+00
LAB 17	0.2208D-01	0.5514D-08	0.743D-04	0.336D+00	0.1570D-07	0.125D-03	0.567D+00	0.6758D-08	0.822D-04	0.372D+00
LAB 18	0.2230D-01	0.8303D-08	0.911D-04	0.409D+00	0.2067D-07	0.144D-03	0.645D+00	0.3393D-07	0.184D-03	0.826D+00
LAB 19	0.2204D-01	0.1873D-08	0.433D-04	0.196D+00	0.5099D-08	0.714D-04	0.324D+00	0.4165D-08	0.645D-04	0.293D+00
LAB 20	0.2196D-01	0.2787D-08	0.528D-04	0.240D+00	-.1260D-07	-.500D+01	-.500D+01	0.1677D-06	0.410D-03	0.186D+01
LAB 21	0.2222D-01	0.7898D-09	0.281D-04	0.127D+00	0.2019D-08	0.449D-04	0.202D+00	0.2804D-08	0.530D-04	0.238D+00
LAB 23	0.2262D-01	0.1580D-08	0.397D-04	0.176D+00	0.2336D-08	0.483D-04	0.214D+00	0.1923D-07	0.139D-03	0.613D+00
RATIO 58 SAMPLE BU										
LAB 2	0.2212D-01	0.9674D-09	0.311D-04	0.141D+00	0.2051D-08	0.453D-04	0.205D+00	0.6813D-08	0.825D-04	0.373D+00
LAB 3	0.2195D-01	0.5048D-08	0.710D-04	0.324D+00	0.1463D-07	0.121D-03	0.551D+00	0.4137D-08	0.643D-04	0.293D+00
LAB 4	0.2235D-01	0.7075D-07	0.266D-03	0.119D+01	0.2079D-06	0.456D-03	0.204D+01	0.3446D-07	0.186D-03	0.831D+00
LAB 5	0.2231D-01	0.1518D-07	0.123D-03	0.552D+00	0.4347D-07	0.209D-03	0.934D+00	0.1656D-07	0.129D-03	0.577D+00
LAB 6	0.2238D-01	0.4877D-09	0.221D-04	0.987D-01	-.6136D-08	-.500D+01	-.500D+01	0.6079D-07	0.247D-03	0.110D+01
LAB 7	0.2208D-01	0.2778D-09	0.167D-04	0.755D-01	-.9643D-08	-.500D+01	-.500D+01	0.8381D-07	0.289D-03	0.131D+01
LAB 8	0.2239D-01	0.1755D-07	0.132D-03	0.592D+00	-.3199D-08	-.500D+01	-.500D+01	0.4468D-06	0.668D-03	0.299D+01
LAB 10	0.2204D-01	0.4936D-08	0.703D-04	0.319D+00	0.1358D-07	0.117D-03	0.529D+00	0.9849D-08	0.992D-04	0.450D+00
LAB 12	0.2228D-01	0.5858D-08	0.765D-04	0.344D+00	0.1427D-07	0.119D-03	0.536D+00	0.2645D-07	0.163D-03	0.730D+00
LAB 13	0.2220D-01	0.3003D-08	0.548D-04	0.247D+00	0.7591D-08	0.871D-04	0.392D+00	0.1135D-07	0.107D-03	0.480D+00
LAB 14	0.2216D-01	0.2104D-08	0.459D-04	0.207D+00	0.4025D-08	0.634D-04	0.286D+00	0.1829D-07	0.135D-03	0.610D+00
LAB 15	0.2232D-01	0.2569D-08	0.507D-04	0.227D+00	0.3802D-08	0.617D-04	0.276D+00	0.3125D-07	0.177D-03	0.792D+00
LAB 16	0.2242D-01	0.3974D-07	0.199D-03	0.889D+00	0.1170D-06	0.342D-03	0.153D+01	0.1798D-07	0.134D-03	0.598D+00
LAB 17	0.2214D-01	0.1036D-09	0.102D-04	0.460D-01	-.8630D-09	-.500D+01	-.500D+01	0.9392D-08	0.969D-04	0.438D+00
LAB 18	0.2244D-01	0.1482D-08	0.385D-04	0.172D+00	0.3300D-08	0.574D-04	0.256D+00	0.9162D-08	0.957D-04	0.427D+00
LAB 19	0.2202D-01	0.4075D-09	0.202D-04	0.917D-01	0.8323D-09	0.288D-04	0.131D+00	0.3121D-08	0.559D-04	0.254D+00
LAB 20	0.2190D-01	0.2399D-07	0.155D-03	0.707D+00	0.6958D-07	0.264D-03	0.120D+01	0.1908D-07	0.138D-03	0.631D+00
LAB 21	0.2227D-01	0.2251D-08	0.474D-04	0.213D+00	0.5883D-08	0.767D-04	0.344D+00	0.6968D-08	0.835D-04	0.375D+00
LAB 23	0.2252D-01	0.6771D-09	0.260D-04	0.116D+00	-.1853D-08	-.500D+01	-.500D+01	0.3107D-07	0.176D-03	0.783D+00
RATIO 58 SAMPLE RU										
LAB 2	0.7267D-02	0.5081D-10	0.713D-05	0.981D-01	-.2677D-09	-.500D+01	-.500D+01	0.3361D-08	0.580D-04	0.798D+00
LAB 3	0.7257D-02	0.8073D-10	0.899D-05	0.124D+00	0.1451D-09	0.120D-04	0.166D+00	0.7771D-09	0.279D-04	0.384D+00
LAB 4	0.7259D-02	0.9497D-10	0.975D-05	0.134D+00	0.2395D-09	0.155D-04	0.213D+00	0.3631D-09	0.191D-04	0.262D+00
LAB 5	0.7381D-02	0.6405D-09	0.253D-04	0.343D+00	0.1640D-08	0.405D-04	0.549D+00	0.2255D-08	0.475D-04	0.643D+00
LAB 6	0.7328D-02	0.1726D-10	0.415D-05	0.567D-01	-.1031D-08	-.500D+01	-.500D+01	0.8664D-08	0.931D-04	0.127D+01
LAB 7	0.7150D-02	0.2083D-09	0.144D-04	0.202D+00	0.2083D-09	0.144D-04	0.202D+00	0.3333D-08	0.577D-04	0.807D+00
LAB 8	0.7317D-02	0.1396D-09	0.118D-04	0.161D+00	-.2831D-08	-.500D+01	-.500D+01	0.2600D-07	0.161D-03	0.220D+01
LAB 10	0.7217D-02	0.5178D-09	0.228D-04	0.315D+00	0.1253D-08	0.354D-04	0.490D+00	0.2401D-08	0.490D-04	0.679D+00
LAB 12	0.7232D-02	0.5382D-11	0.232D-05	0.321D-01	-.3533D-09	-.500D+01	-.500D+01	0.2956D-08	0.544D-04	0.752D+00
LAB 13	0.7263D-02	0.6383D-09	0.253D-04	0.348D+00	0.9728D-09	0.312D-04	0.429D+00	0.7537D-08	0.868D-04	0.120D+01
LAB 14	0.7267D-02	0.5052D-10	0.711D-05	0.978D-01	0.7165D-10	0.846D-05	0.116D+00	0.6393D-09	0.253D-04	0.348D+00
LAB 15	0.7360D-02	0.1568D-09	0.125D-04	0.170D+00	-.2385D-09	-.500D+01	-.500D+01	0.5670D-08	0.753D-04	0.102D+01
LAB 16	0.7260D-02	0.5057D-10	0.711D-05	0.979D-01	0.4317D-10	0.657D-05	0.905D-01	0.8683D-09	0.295D-04	0.406D+00
LAB 17	0.7236D-02	0.3141D-09	0.177D-04	0.245D+00	0.6786D-09	0.260D-04	0.360D+00	0.2109D-08	0.459D-04	0.635D+00
LAB 18	0.7320D-02	0.5942D-09	0.244D-04	0.333D+00	0.1488D-08	0.386D-04	0.527D+00	0.2360D-08	0.486D-04	0.664D+00
LAB 19	0.7187D-02	0.3627D-11	0.190D-05	0.265D-01	-.3173D-09	-.500D+01	-.500D+01	0.2625D-08	0.512D-04	0.713D+00
LAB 20	0.7137D-02	0.9977D-08	0.999D-04	0.140D+01	0.2925D-07	0.171D-03	0.240D+01	0.5490D-08	0.741D-04	0.104D+01
LAB 21	0.2912D-01	0.0	0.0	0.0	-.5000D+01	-.500D+01	-.500D+01	0.1247D-06	0.353D-03	0.121D+01
LAB 23	0.7195D-02	0.2006D-08	0.448D-04	0.623D+00	0.5557D-08	0.745D-04	0.104D+01	0.3699D-08	0.608D-04	0.845D+00
RATIO 58 SAMPLE AS										
LAB 2	0.2208D-01	0.1176D-08	0.343D-04	0.155D+00	-.1937D-08	-.500D+01	-.500D+01	0.4371D-07	0.209D-03	0.947D+00
LAB 3	0.2215D-01	0.4608D-09	0.215D-04	0.969D-01	0.7093D-09	0.266D-04	0.120D+00	0.5385D-08	0.734D-04	0.331D+00
LAB 4	0.2261D-01	0.8247D-08	0.908D-04	0.402D+00	-.1944D-07	-.500D+01	-.500D+01	0.3535D-06	0.595D-03	0.263D+01
LAB 5	0.2231D-01	0.3029D-08	0.550D-04	0.247D+00	0.6039D-08	0.777D-04	0.348D+00	0.2439D-07	0.156D-03	0.700D+00
LAB 6	0.2222D-01	0.1694D-08	0.412D-04	0.185D+00	-.1414D-09	-.500D+01	-.500D+01	0.4179D-07	0.204D-03	0.920D+00
LAB 7	0.2204D-01	0.1974D-07	0.140D-03	0.638D+00	0.4274D-07	0.207D-03	0.938D+00	0.1318D-06	0.363D-03	0.165D+01

LAB 8	0.2217D-01	0.3408D-07	0.185D-03	0.833D+00	0.8430D-07	0.290D-03	0.131D+01	0.1435D-06	0.379D-03	0.171D+01
LAB 10	0.2205D-01	0.8627D-09	0.294D-04	0.133D+00	0.2126D-08	0.461D-04	0.209D+00	0.3699D-08	0.608D-04	0.276D+00
LAB 12	0.2212D-01	0.1167D-07	0.108D-03	0.488D+00	0.3026D-07	0.174D-03	0.786D+00	0.3797D-07	0.195D-03	0.881D+00
LAB 13	0.2228D-01	0.3751D-10	0.612D-05	0.275D-01	-.1996D-08	-.500D+01	-.500D+01	0.1686D-07	0.130D-03	0.583D+00
LAB 14	0.2228D-01	0.1436D-08	0.379D-04	0.170D+00	0.3535D-08	0.595D-04	0.267D+00	0.6173D-08	0.786D-04	0.353D+00
LAB 15	0.2240D-01	0.3379D-08	0.581D-04	0.259D+00	0.6821D-08	0.826D-04	0.369D+00	0.2652D-07	0.163D-03	0.727D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.2223D-01	0.9719D-08	0.986D-04	0.444D+00	0.1819D-07	0.135D-03	0.607D+00	0.8771D-07	0.296D-03	0.133D+01
LAB 18	0.2251D-01	0.1005D-07	0.100D-03	0.445D+00	0.2307D-07	0.152D-03	0.675D+00	0.5658D-07	0.238D-03	0.106D+01
LAB 19	0.2237D-01	0.7569D-10	0.870D-05	0.389D-01	-.1019D-08	-.500D+01	-.500D+01	0.9965D-08	0.998D-04	0.446D+00
LAB 20	0.2163D-01	0.1805D-07	0.134D-03	0.621D+00	0.4602D-07	0.215D-03	0.992D+00	0.6512D-07	0.255D-03	0.118D+01
LAB 21	0.2211D-01	0.1225D-07	0.111D-03	0.501D+00	0.3630D-07	0.191D-03	0.862D+00	0.3721D-08	0.610D-04	0.276D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 58 SAMPLE BS										
LAB 2	0.2211D-01	0.3670D-08	0.606D-04	0.274D+00	0.9476D-08	0.973D-04	0.440D+00	0.1228D-07	0.111D-03	0.501D+00
LAB 3	0.2202D-01	0.2015D-08	0.449D-04	0.204D+00	0.5392D-08	0.734D-04	0.334D+00	0.5218D-08	0.722D-04	0.328D+00
LAB 4	0.2209D-01	0.5453D-07	0.234D-03	0.106D+01	0.1424D-06	0.377D-03	0.171D+01	0.1699D-06	0.412D-03	0.187D+01
LAB 5	0.2243D-01	0.1449D-07	0.120D-03	0.537D+00	0.3754D-07	0.194D-03	0.864D+00	0.4742D-07	0.218D-03	0.971D+00
LAB 6	0.2233D-01	0.3153D-07	0.178D-03	0.795D+00	0.8918D-07	0.299D-03	0.134D+01	0.4327D-07	0.208D-03	0.932D+00
LAB 7	0.2207D-01	0.8125D-08	0.901D-04	0.408D+00	-.4524D-08	-.500D+01	-.500D+01	0.2312D-06	0.481D-03	0.218D+01
LAB 8	0.2243D-01	0.1887D-07	0.137D-03	0.612D+00	0.3457D-07	0.186D-03	0.829D+00	0.1764D-06	0.420D-03	0.187D+01
LAB 10	0.2203D-01	0.5828D-09	0.241D-04	0.110D+00	-.5863D-10	-.500D+01	-.500D+01	0.1446D-07	0.120D-03	0.546D+00
LAB 12	0.2221D-01	0.2203D-08	0.469D-04	0.211D+00	0.1514D-08	0.389D-04	0.175D+00	0.4076D-07	0.202D-03	0.909D+00
LAB 13	0.2229D-01	0.2771D-09	0.166D-04	0.747D-01	0.1282D-09	0.113D-04	0.508D-01	0.5625D-08	0.750D-04	0.336D+00
LAB 14	0.2210D-01	0.9960D-09	0.316D-04	0.143D+00	0.2166D-08	0.465D-04	0.211D+00	0.6576D-08	0.811D-04	0.367D+00
LAB 15	0.2232D-01	0.1111D-08	0.333D-04	0.149D+00	-.2381D-08	-.500D+01	-.500D+01	0.4571D-07	0.214D-03	0.958D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.2207D-01	0.2040D-08	0.452D-04	0.205D+00	0.3821D-08	0.618D-04	0.280D+00	0.1838D-07	0.136D-03	0.614D+00
LAB 18	0.2260D-01	0.5952D-07	0.244D-03	0.108D+01	0.1634D-06	0.404D-03	0.179D+01	0.1212D-06	0.348D-03	0.154D+01
LAB 19	0.2237D-01	0.3065D-08	0.554D-04	0.247D+00	0.8306D-08	0.911D-04	0.407D+00	0.7108D-08	0.843D-04	0.377D+00
LAB 20	0.2186D-01	0.1964D-07	0.140D-03	0.641D+00	0.3534D-07	0.188D-03	0.860D+00	0.1885D-06	0.434D-03	0.199D+01
LAB 21	0.2219D-01	0.3027D-08	0.550D-04	0.248D+00	0.7532D-08	0.868D-04	0.391D+00	0.1240D-07	0.111D-03	0.502D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 58 SAMPLE RS										
LAB 2	0.7515D-02	0.3956D-08	0.629D-04	0.837D+00	0.1153D-07	0.107D-03	0.143D+01	0.2737D-08	0.523D-04	0.696D+00
LAB 3	0.7453D-02	0.6615D-10	0.813D-05	0.109D+00	-.8960D-09	-.500D+01	-.500D+01	0.8755D-08	0.936D-04	0.126D+01
LAB 4	0.7462D-02	0.1130D-07	0.106D-03	0.142D+01	0.2894D-07	0.170D-03	0.228D+01	0.3970D-07	0.199D-03	0.267D+01
LAB 5	0.7518D-02	0.1212D-09	0.110D-04	0.146D+00	-.8457D-09	-.500D+01	-.500D+01	0.9674D-08	0.984D-04	0.131D+01
LAB 6	0.7592D-02	0.1307D-07	0.114D-03	0.151D+01	0.3852D-07	0.196D-03	0.259D+01	0.5485D-08	0.741D-04	0.975D+00
LAB 7	0.7550D-02	0.9896D-09	0.315D-04	0.417D+00	0.1109D-08	0.333D-04	0.441D+00	0.1488D-07	0.122D-03	0.162D+01
LAB 8	0.7692D-02	0.6424D-09	0.253D-04	0.330D+00	-.3594D-08	-.500D+01	-.500D+01	0.4417D-07	0.210D-03	0.273D+01
LAB 10	0.7420D-02	0.4156D-09	0.204D-04	0.275D+00	0.7771D-09	0.279D-04	0.376D+00	0.3757D-08	0.613D-04	0.826D+00
LAB 12	0.7500D-02	0.1229D-08	0.351D-04	0.468D+00	-.1458D-09	-.500D+01	-.500D+01	0.3067D-07	0.175D-03	0.234D+01
LAB 13	0.7392D-02	0.6524D-09	0.255D-04	0.346D+00	0.1759D-08	0.419D-04	0.567D+00	0.1589D-08	0.399D-04	0.539D+00
LAB 14	0.7462D-02	0.2552D-10	0.505D-05	0.677D-01	-.1168D-10	-.500D+01	-.500D+01	0.7060D-09	0.266D-04	0.356D+00
LAB 15	0.7612D-02	0.2058D-08	0.454D-04	0.596D+00	0.5704D-08	0.755D-04	0.992D+00	0.3756D-08	0.613D-04	0.805D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.7390D-02	0.2146D-09	0.146D-04	0.198D+00	0.5062D-09	0.225D-04	0.304D+00	0.1100D-08	0.332D-04	0.449D+00
LAB 18	0.7544D-02	0.4148D-08	0.644D-04	0.854D+00	0.1138D-07	0.107D-03	0.141D+01	0.8480D-08	0.921D-04	0.122D+01
LAB 19	0.7661D-02	0.9334D-09	0.306D-04	0.399D+00	0.2355D-08	0.485D-04	0.633D+00	0.3565D-08	0.597D-04	0.779D+00
LAB 20	0.7346D-02	0.1875D-08	0.433D-04	0.589D+00	0.4487D-08	0.670D-04	0.912D+00	0.9103D-08	0.954D-04	0.130D+01
LAB 21	0.8439D-01	0.4610D-05	0.215D-02	0.254D+01	0.1382D-04	0.372D-02	0.440D+01	0.1160D-06	0.341D-03	0.404D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 68 SAMPLE AU										
LAB 2	0.3919D-02	0.1046D-09	0.102D-04	0.261D+00	0.8489D-10	0.921D-05	0.235D+00	0.1832D-08	0.428D-04	0.109D+01
LAB 3	0.4023D-02	0.3038D-08	0.551D-04	0.137D+01	0.8935D-08	0.945D-04	0.235D+01	0.1433D-08	0.379D-04	0.941D+00
LAB 4	0.5267D-02	0.4498D-06	0.671D-03	0.127D+02	0.1333D-05	0.115D-02	0.219D+02	0.1354D-06	0.368D-03	0.699D+01
LAB 5	0.4017D-02	0.1369D-08	0.370D-04	0.921D+00	0.3431D-08	0.586D-04	0.146D+01	0.5406D-08	0.735D-04	0.183D+01
LAB 6	0.3951D-02	0.1130D-09	0.106D-04	0.269D+00	0.5292D-10	0.727D-05	0.184D+00	0.2288D-08	0.478D-04	0.121D+01
LAB 7	0.3896D-02	0.4861D-09	0.220D-04	0.566D+00	0.1064D-08	0.326D-04	0.837D+00	0.3155D-08	0.562D-04	0.144D+01
LAB 8	0.3867D-02	0.4288D-08	0.655D-04	0.169D+01	0.1044D-07	0.102D-03	0.264D+01	0.1940D-07	0.139D-03	0.360D+01
LAB 10	0.3929D-02	0.1435D-09	0.120D-04	0.305D+00	0.2398D-09	0.155D-04	0.394D+00	0.1526D-08	0.391D-04	0.994D+00
LAB 12	0.3967D-02	0.2603D-08	0.510D-04	0.129D+01	0.6504D-08	0.806D-04	0.203D+01	0.1044D-07	0.102D-03	0.258D+01
LAB 13	0.3905D-02	0.1775D-09	0.133D-04	0.341D+00	0.2607D-09	0.161D-04	0.414D+00	0.2175D-08	0.466D-04	0.119D+01
LAB 14	0.3933D-02	0.4861D-09	0.220D-04	0.561D+00	0.1280D-08	0.358D-04	0.910D+00	0.1429D-08	0.378D-04	0.961D+00
LAB 15	0.3963D-02	0.1215D-11	0.110D-05	0.278D-01	-.6194D-09	-.500D+01	-.500D+01	0.4985D-08	0.706D-04	0.178D+01

LAB 16	0.3918D-02	0.2257D-11	0.150D-05	0.383D-01	-.1247D-09	-.500D+01	-.500D+01	0.1052D-08	0.324D-04	0.828D+00
LAB 17	0.3907D-02	0.1130D-09	0.106D-04	0.272D+00	0.1806D-09	0.134D-04	0.344D+00	0.1268D-08	0.356D-04	0.911D+00
LAB 18	0.3844D-02	0.4344D-09	0.208D-04	0.542D+00	0.8670D-09	0.294D-04	0.766D+00	0.3491D-08	0.591D-04	0.154D+01
LAB 19	0.3920D-02	0.5980D-10	0.773D-05	0.197D+00	0.1343D-09	0.116D-04	0.296D+00	0.3613D-09	0.190D-04	0.485D+00
LAB 20	0.3868D-02	0.6318D-09	0.251D-04	0.650D+00	0.1626D-08	0.403D-04	0.104D+01	0.2160D-08	0.465D-04	0.120D+01
LAB 21	0.3963D-02	0.2694D-09	0.164D-04	0.414D+00	0.5883D-09	0.243D-04	0.612D+00	0.1760D-08	0.420D-04	0.106D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 68 SAMPLE BU										
LAB 2	0.3921D-02	0.3425D-10	0.585D-05	0.149D+00	-.5639D-10	-.500D+01	-.500D+01	0.1273D-08	0.357D-04	0.910D+00
LAB 3	0.3955D-02	0.2456D-09	0.157D-04	0.396D+00	0.7015D-09	0.265D-04	0.670D+00	0.2822D-09	0.168D-04	0.425D+00
LAB 4	0.4117D-02	0.7569D-08	0.870D-04	0.211D+01	0.2253D-07	0.150D-03	0.365D+01	0.1429D-08	0.378D-04	0.918D+00
LAB 5	0.3917D-02	0.2772D-09	0.167D-04	0.425D+00	0.2005D-09	0.142D-04	0.361D+00	0.5050D-08	0.711D-04	0.181D+01
LAB 6	0.3952D-02	0.1355D-10	0.368D-05	0.931D-01	-.4351D-09	-.500D+01	-.500D+01	0.3806D-08	0.617D-04	0.156D+01
LAB 7	0.3900D-02	0.1562D-09	0.125D-04	0.321D+00	-.5580D-09	-.500D+01	-.500D+01	0.8214D-08	0.906D-04	0.232D+01
LAB 8	0.3829D-02	0.3403D-08	0.583D-04	0.152D+01	0.9338D-08	0.966D-04	0.252D+01	0.6964D-08	0.835D-04	0.218D+01
LAB 10	0.3895D-02	0.4943D-09	0.222D-04	0.571D+00	0.1289D-08	0.359D-04	0.922D+00	0.1550D-08	0.394D-04	0.101D+01
LAB 12	0.3960D-02	0.6564D-09	0.256D-04	0.647D+00	0.8277D-09	0.288D-04	0.727D+00	0.9133D-08	0.956D-04	0.241D+01
LAB 13	0.3897D-02	0.5728D-09	0.239D-04	0.614D+00	0.1456D-08	0.382D-04	0.979D+00	0.2104D-08	0.459D-04	0.118D+01
LAB 14	0.3962D-02	0.5208D-10	0.722D-05	0.182D+00	-.1637D-09	-.500D+01	-.500D+01	0.2560D-08	0.506D-04	0.128D+01
LAB 15	0.3960D-02	0.2193D-09	0.148D-04	0.374D+00	0.4847D-09	0.220D-04	0.556D+00	0.1385D-08	0.372D-04	0.940D+00
LAB 16	0.3975D-02	0.9236D-10	0.961D-05	0.242D+00	0.1059D-09	0.103D-04	0.259D+00	0.1370D-08	0.370D-04	0.931D+00
LAB 17	0.3931D-02	0.1229D-08	0.351D-04	0.892D+00	0.3550D-08	0.596D-04	0.152D+01	0.1090D-08	0.330D-04	0.840D+00
LAB 18	0.3904D-02	0.4170D-07	0.204D-03	0.523D+01	0.1248D-06	0.353D-03	0.905D+01	0.2414D-08	0.491D-04	0.126D+01
LAB 19	0.3906D-02	0.1629D-09	0.128D-04	0.327D+00	0.4344D-09	0.208D-04	0.534D+00	0.4339D-09	0.208D-04	0.533D+00
LAB 20	0.3807D-02	0.8441D-09	0.291D-04	0.763D+00	0.2415D-08	0.491D-04	0.129D+01	0.9368D-09	0.306D-04	0.804D+00
LAB 21	0.3942D-02	0.4691D-09	0.217D-04	0.549D+00	0.1283D-08	0.358D-04	0.909D+00	0.9943D-09	0.315D-04	0.800D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 68 SAMPLE RU										
LAB 2	0.7579D-05	0.8172D-12	0.904D-06	0.119D+02	-.5899D-12	-.500D+01	-.500D+01	0.2433D-10	0.493D-05	0.651D+02
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 10	0.1292D-05	0.5330D-12	0.730D-06	0.565D+02	0.1555D-11	0.125D-05	0.965D+02	0.3512D-12	0.593D-06	0.459D+02
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.1965D-02	0.0	0.0	0.0	-.5000D+01	-.500D+01	-.500D+01	0.4457D-08	0.668D-04	0.340D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 68 SAMPLE AS										
LAB 2	0.3873D-02	0.1351D-09	0.116D-04	0.300D+00	0.3462D-09	0.186D-04	0.480D+00	0.4724D-09	0.217D-04	0.561D+00
LAB 3	0.3835D-02	0.2340D-08	0.484D-04	0.126D+01	0.6985D-08	0.836D-04	0.218D+01	0.2871D-09	0.169D-04	0.442D+00
LAB 4	0.3842D-02	0.1867D-06	0.432D-03	0.112D+02	0.5535D-06	0.744D-03	0.194D+02	0.5226D-07	0.229D-03	0.595D+01
LAB 5	0.3909D-02	0.3639D-09	0.191D-04	0.488D+00	0.6832D-09	0.261D-04	0.669D+00	0.3267D-08	0.572D-04	0.146D+01
LAB 6	0.3912D-02	0.7191D-09	0.268D-04	0.686D+00	0.1500D-08	0.387D-04	0.990D+00	0.5255D-08	0.725D-04	0.185D+01
LAB 7	0.3858D-02	0.3038D-08	0.551D-04	0.143D+01	0.8564D-08	0.925D-04	0.240D+01	0.4405D-08	0.664D-04	0.172D+01
LAB 8	0.3837D-02	0.2083D-09	0.144D-04	0.376D+00	-.1912D-08	-.500D+01	-.500D+01	0.2030D-07	0.142D-03	0.371D+01
LAB 10	0.3855D-02	0.6148D-10	0.784D-05	0.203D+00	-.2611D-10	-.500D+01	-.500D+01	0.1684D-08	0.410D-04	0.106D+01
LAB 12	0.3885D-02	0.2621D-08	0.512D-04	0.132D+01	0.6376D-08	0.799D-04	0.206D+01	0.1189D-07	0.109D-03	0.281D+01
LAB 13	0.3859D-02	0.1478D-08	0.384D-04	0.996D+00	0.4301D-08	0.656D-04	0.170D+01	0.1055D-08	0.325D-04	0.842D+00
LAB 14	0.3900D-02	0.1927D-10	0.439D-05	0.113D+00	0.4985D-11	0.223D-05	0.572D-01	0.4226D-09	0.206D-04	0.527D+00
LAB 15	0.3952D-02	0.2507D-09	0.158D-04	0.401D+00	0.5059D-09	0.225D-04	0.569D+00	0.1970D-08	0.444D-04	0.112D+01
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.3952D-02	0.1523D-08	0.390D-04	0.988D+00	0.4248D-08	0.652D-04	0.165D+01	0.2577D-08	0.508D-04	0.128D+01
LAB 18	0.3871D-02	0.2402D-07	0.155D-03	0.400D+01	0.7161D-07	0.268D-03	0.691D+01	0.3620D-08	0.602D-04	0.155D+01
LAB 19	0.3899D-02	0.1551D-09	0.125D-04	0.319D+00	0.3366D-09	0.183D-04	0.471D+00	0.1030D-08	0.321D-04	0.823D+00
LAB 20	0.3569D-02	0.4390D-08	0.663D-04	0.186D+01	0.1301D-07	0.114D-03	0.320D+01	0.1274D-08	0.357D-04	0.100D+01
LAB 21	0.3866D-02	0.4502D-10	0.671D-05	0.174D+00	0.9140D-10	0.956D-05	0.247D+00	0.3493D-09	0.187D-04	0.483D+00

LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 68 SAMPLE BS										
LAB 2	0.3873D-02	0.4455D-10	0.667D-05	0.172D+00	0.5880D-10	0.767D-05	0.198D+00	0.5987D-09	0.245D-04	0.632D+00
LAB 3	0.3787D-02	0.2248D-09	0.150D-04	0.396D+00	0.6392D-09	0.253D-04	0.668D+00	0.2830D-09	0.168D-04	0.444D+00
LAB 4	0.3654D-02	0.1862D-06	0.431D-03	0.118D+02	0.5542D-06	0.744D-03	0.204D+02	0.3446D-07	0.186D-03	0.508D+01
LAB 5	0.3946D-02	0.4678D-09	0.216D-04	0.548D+00	0.7055D-09	0.266D-04	0.673D+00	0.5584D-08	0.747D-04	0.189D+01
LAB 6	0.3932D-02	0.1063D-09	0.103D-04	0.262D+00	-.1523D-09	-.500D+01	-.500D+01	0.3768D-08	0.614D-04	0.156D+01
LAB 7	0.3812D-02	0.6771D-09	0.260D-04	0.683D+00	0.1116D-08	0.334D-04	0.876D+00	0.7321D-08	0.856D-04	0.224D+01
LAB 8	0.3929D-02	0.1944D-08	0.441D-04	0.112D+01	0.4903D-08	0.700D-04	0.178D+01	0.7440D-08	0.863D-04	0.220D+01
LAB 10	0.3860D-02	0.4379D-09	0.209D-04	0.542D+00	0.9274D-09	0.305D-04	0.789D+00	0.3091D-08	0.556D-04	0.144D+01
LAB 12	0.3864D-02	0.1981D-09	0.141D-04	0.364D+00	-.5050D-09	-.500D+01	-.500D+01	0.8794D-08	0.938D-04	0.243D+01
LAB 13	0.3917D-02	0.8045D-09	0.284D-04	0.724D+00	0.2326D-08	0.482D-04	0.123D+01	0.7001D-09	0.265D-04	0.675D+00
LAB 14	0.3872D-02	0.2054D-09	0.143D-04	0.370D+00	0.5764D-09	0.240D-04	0.620D+00	0.3179D-09	0.178D-04	0.460D+00
LAB 15	0.3948D-02	0.6049D-09	0.246D-04	0.623D+00	0.9307D-09	0.305D-04	0.773D+00	0.7071D-08	0.841D-04	0.213D+01
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.3863D-02	0.2658D-09	0.163D-04	0.422D+00	0.6702D-09	0.259D-04	0.670D+00	0.1018D-08	0.319D-04	0.826D+00
LAB 18	0.3532D-02	0.2819D-07	0.168D-03	0.475D+01	0.8241D-07	0.287D-03	0.813D+01	0.1731D-07	0.132D-03	0.372D+01
LAB 19	0.3875D-02	0.1663D-08	0.408D-04	0.105D+01	0.4856D-08	0.697D-04	0.180D+01	0.1059D-08	0.325D-04	0.840D+00
LAB 20	0.3547D-02	0.1029D-08	0.321D-04	0.905D+00	0.2844D-08	0.533D-04	0.150D+01	0.1949D-08	0.441D-04	0.124D+01
LAB 21	0.3866D-02	0.3366D-11	0.183D-05	0.475D-01	-.1893D-09	-.500D+01	-.500D+01	0.1595D-08	0.399D-04	0.103D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 68 SAMPLE RS										
LAB 2	0.1803D-04	0.7241D-13	0.269D-06	0.149D+01	0.1651D-12	0.406D-06	0.225D+01	0.4170D-12	0.646D-06	0.358D+01
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 10	0.1787D-04	0.4818D-11	0.219D-05	0.123D+02	0.1296D-10	0.360D-05	0.201D+02	0.1197D-10	0.346D-05	0.194D+02
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 15	0.7276D-04	0.1491D-08	0.386D-04	0.531D+02	0.2931D-08	0.541D-04	0.744D+02	0.4068D-09	0.202D-04	0.277D+02
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 20	0.7112D-04	0.5381D-09	0.232D-04	0.326D+02	0.1610D-08	0.401D-04	0.564D+02	0.3630D-10	0.603D-05	0.847D+01
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RATIO 92 SAMPLE PS										
LAB 2	0.1340D-01	0.1406D-10	0.375D-05	0.180D+01	-.2455D-10	-.500D+01	-.500D+01	0.4214D-09	0.205D-04	0.983D+01
LAB 3	0.1340D-01	0.3703D-10	0.609D-05	0.297D+01	0.8857D-10	0.941D-05	0.460D+01	0.1801D-09	0.134D-04	0.656D+01
LAB 4	0.1340D-01	0.2533D-11	0.159D-05	0.823D+00	0.7240D-11	0.269D-05	0.139D+01	0.2875D-11	0.170D-05	0.876D+00
LAB 5	0.1340D-01	0.3299D-09	0.182D-04	0.739D+01	0.7292D-09	0.270D-04	0.110D+02	0.2083D-08	0.456D-04	0.186D+02
LAB 6	0.1340D-01	0.4328D-10	0.658D-05	0.223D+01	0.8209D-10	0.906D-05	0.308D+01	0.3821D-09	0.195D-04	0.664D+01
LAB 7	0.1340D-01	0.4861D-11	0.220D-05	0.132D+01	0.1064D-10	0.326D-05	0.195D+01	0.3155D-10	0.562D-05	0.336D+01
LAB 8	0.1340D-01	0.0	0.0	0.0	-.5000D+01	-.500D+01	-.500D+01	0.3679D-07	0.192D-03	0.548D+02
LAB 10	0.1340D-01	0.2965D-11	0.172D-05	0.866D+00	-.6257D-11	-.500D+01	-.500D+01	0.1212D-09	0.110D-04	0.554D+01
LAB 12	0.1340D-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.1340D-01	0.1642D-10	0.405D-05	0.197D+01	0.3701D-10	0.608D-05	0.296D+01	0.9797D-10	0.990D-05	0.482D+01
LAB 14	0.1340D-01	0.1562D-11	0.125D-05	0.621D+00	0.2381D-11	0.154D-05	0.767D+00	0.1845D-10	0.430D-05	0.213D+01
LAB 15	0.1340D-01	0.1313D-10	0.362D-05	0.163D+01	0.1470D-10	0.383D-05	0.173D+01	0.1975D-09	0.141D-04	0.633D+01
LAB 16	0.2745D-02	0.7413D-10	0.861D-05	0.314D+00	0.1710D-09	0.131D-04	0.476D+00	0.4113D-09	0.203D-04	0.739D+00
LAB 17	0.1340D-01	0.1736D-12	0.417D-06	0.211D+00	-.1786D-11	-.500D+01	-.500D+01	0.1845D-10	0.430D-05	0.217D+01
LAB 18	0.1340D-01	0.2299D-10	0.479D-05	0.168D+01	0.6557D-10	0.810D-05	0.283D+01	0.2714D-10	0.521D-05	0.182D+01
LAB 19	0.1340D-01	0.4631D-10	0.681D-05	0.317D+01	0.1312D-09	0.115D-04	0.533D+01	0.6163D-10	0.785D-05	0.365D+01
LAB 20	0.1340D-01	0.1548D-10	0.393D-05	0.215D+01	0.2334D-10	0.483D-05	0.264D+01	0.1849D-09	0.136D-04	0.743D+01
LAB 21	0.1340D-01	0.2000D-07	0.141D-03	0.268D+01	0.3983D-07	0.200D-03	0.378D+01	0.1449D-08	0.381D-04	0.722D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 2 SAMPLE PS										

LAB 2	0.8481D-03	0.1914D-10	0.437D-05	0.516D+00	-.4821D-10	-.500D+01	-.500D+01	0.6920D-09	0.263D-04	0.310D+01
LAB 3	0.8197D-03	0.4951D-10	0.704D-05	0.858D+00	0.8728D-10	0.934D-05	0.114D+01	0.4900D-09	0.221D-04	0.270D+01
LAB 4	0.8345D-03	0.6424D-13	0.253D-06	0.304D-01	-.6610D-11	-.500D+01	-.500D+01	0.5442D-10	0.738D-05	0.884D+00
LAB 5	0.9042D-03	0.2778D-09	0.167D-04	0.184D+01	0.1414D-09	0.119D-04	0.132D+01	0.5536D-08	0.744D-04	0.823D+01
LAB 6	0.8464D-03	0.7473D-11	0.273D-05	0.323D+00	-.4732D-10	-.500D+01	-.500D+01	0.5579D-09	0.236D-04	0.279D+01
LAB 7	0.7975D-03	0.9896D-11	0.315D-05	0.394D+00	-.2493D-10	-.500D+01	-.500D+01	0.4369D-09	0.209D-04	0.262D+01
LAB 8	0.9625D-03	0.0	0.0	0.0	-.5000D+01	-.500D+01	-.500D+01	0.5089D-07	0.226D-03	0.234D+02
LAB 10	0.8294D-03	0.4829D-10	0.695D-05	0.838D+00	0.1154D-09	0.107D-04	0.130D+01	0.2360D-09	0.154D-04	0.185D+01
LAB 12	0.8300D-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.8070D-03	0.2866D-10	0.535D-05	0.663D+00	0.5806D-10	0.762D-05	0.944D+00	0.2234D-09	0.149D-04	0.185D+01
LAB 14	0.8350D-03	0.2083D-11	0.144D-05	0.173D+00	0.2083D-11	0.144D-05	0.173D+00	0.3333D-10	0.577D-05	0.691D+00
LAB 15	0.8505D-03	0.4823D-10	0.695D-05	0.817D+00	0.6026D-10	0.776D-05	0.913D+00	0.6756D-09	0.260D-04	0.306D+01
LAB 16	0.1339D-02	0.1453D-09	0.121D-04	0.900D+00	0.4033D-09	0.201D-04	0.150D+01	0.2613D-09	0.162D-04	0.121D+01
LAB 17	0.8208D-03	0.7465D-11	0.273D-05	0.333D+00	0.1868D-10	0.432D-05	0.526D+00	0.2976D-10	0.546D-05	0.665D+00
LAB 18	0.8417D-03	0.6283D-11	0.251D-05	0.298D+00	0.1323D-10	0.364D-05	0.432D+00	0.4491D-10	0.670D-05	0.796D+00
LAB 19	0.8461D-03	0.3233D-10	0.569D-05	0.672D+00	0.7764D-10	0.881D-05	0.104D+01	0.1549D-09	0.124D-04	0.147D+01
LAB 20	0.8127D-03	0.3412D-10	0.584D-05	0.719D+00	0.6448D-10	0.803D-05	0.988D+00	0.3029D-09	0.174D-04	0.214D+01
LAB 21	0.1474D-02	0.3399D-09	0.184D-04	0.125D+01	0.6260D-09	0.250D-04	0.170D+01	0.4314D-09	0.208D-04	0.141D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 89 SAMPLE AU										
LAB 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.1448D-01	0.1377D-07	0.117D-03	0.810D+00	0.3254D-07	0.180D-03	0.125D+01	0.7012D-07	0.265D-03	0.183D+01
LAB 8	0.1522D-01	0.1059D-08	0.325D-04	0.214D+00	-.2577D-07	-.500D+01	-.500D+01	0.2315D-06	0.481D-03	0.316D+01
LAB 10	0.1459D-01	0.1141D-08	0.338D-04	0.231D+00	0.2974D-08	0.545D-04	0.374D+00	0.3589D-08	0.599D-04	0.411D+00
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.1497D-01	0.3663D-08	0.605D-04	0.404D+00	0.1043D-07	0.102D-03	0.682D+00	0.4464D-08	0.668D-04	0.446D+00
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.1622D-01	0.9032D-08	0.950D-04	0.586D+00	0.2608D-07	0.162D-03	0.996D+00	0.8106D-08	0.900D-04	0.555D+00
LAB 17	0.1480D-01	0.1970D-08	0.444D-04	0.300D+00	0.4916D-08	0.701D-04	0.474D+00	0.7957D-08	0.892D-04	0.603D+00
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.3520D-01	0.1565D-03	0.125D-01	0.355D+02	0.4694D-03	0.217D-01	0.615D+02	0.1373D-06	0.370D-03	0.105D+01
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 89 SAMPLE BU										
LAB 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.1490D-01	0.1193D-07	0.109D-03	0.733D+00	0.2800D-07	0.167D-03	0.112D+01	0.6226D-07	0.250D-03	0.167D+01
LAB 8	0.1494D-01	0.7865D-08	0.887D-04	0.594D+00	0.9821D-09	0.313D-04	0.210D+00	0.1809D-06	0.425D-03	0.285D+01
LAB 10	0.1459D-01	0.1347D-08	0.367D-04	0.252D+00	0.3309D-08	0.575D-04	0.394D+00	0.5854D-08	0.765D-04	0.524D+00
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.1494D-01	0.2817D-08	0.531D-04	0.355D+00	0.7869D-08	0.887D-04	0.594D+00	0.4664D-08	0.683D-04	0.457D+00
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.1471D-01	0.4047D-09	0.201D-04	0.137D+00	0.8978D-09	0.300D-04	0.204D+00	0.2530D-08	0.503D-04	0.342D+00
LAB 17	0.1486D-01	0.2314D-09	0.152D-04	0.102D+00	-.1144D-08	-.500D+01	-.500D+01	0.1471D-07	0.121D-03	0.816D+00
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.2728D-01	0.1789D-05	0.134D-02	0.490D+01	0.5339D-05	0.231D-02	0.847D+01	0.2373D-06	0.487D-03	0.179D+01
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 89 SAMPLE RU										
LAB 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LAB 8	0.3000D-03	0.3333D-08	0.577D-04	0.192D+02	0.1000D-07	0.100D-03	0.333D+02	0.1093D-39	0.105D-19	0.349D-14
LAB 10	0.7162D-04	0.1255D-11	0.112D-05	0.156D+01	0.2234D-11	0.149D-05	0.209D+01	0.1226D-10	0.350D-05	0.489D+01
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.9583D-04	0.4809D-10	0.693D-05	0.724D+01	0.1391D-09	0.118D-04	0.123D+02	0.4167D-10	0.645D-05	0.674D+01
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.4417D-04	0.4984D-10	0.706D-05	0.160D+02	0.1486D-09	0.122D-04	0.276D+02	0.7667D-11	0.277D-05	0.627D+01
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.3279D-02	0.1054D-06	0.325D-03	0.990D+01	0.3086D-06	0.555D-03	0.169D+02	0.6229D-07	0.250D-03	0.761D+01
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 89 SAMPLE AS										
LAB 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.1452D-01	0.1319D-08	0.363D-04	0.250D+00	-.8631D-09	-.500D+01	-.500D+01	0.3857D-07	0.196D-03	0.135D+01
LAB 8	0.1545D-01	0.1356D-06	0.368D-03	0.238D+01	0.3059D-06	0.553D-03	0.358D+01	0.8081D-06	0.899D-03	0.582D+01
LAB 10	0.1437D-01	0.1288D-08	0.359D-04	0.250D+00	0.1856D-08	0.431D-04	0.300D+00	0.1607D-07	0.127D-03	0.882D+00
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.1497D-01	0.2325D-07	0.152D-03	0.102D+01	0.6894D-07	0.263D-03	0.175D+01	0.6369D-08	0.798D-04	0.533D+00
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.1480D-01	0.9005D-09	0.300D-04	0.203D+00	0.1629D-08	0.404D-04	0.273D+00	0.8583D-08	0.926D-04	0.626D+00
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.5754D-01	0.1707D-04	0.413D-02	0.718D+01	0.4737D-04	0.688D-02	0.120D+02	0.3074D-04	0.554D-02	0.964D+01
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 89 SAMPLE BS										
LAB 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.1440D-01	0.5349D-07	0.231D-03	0.161D+01	0.1567D-06	0.396D-03	0.275D+01	0.3012D-07	0.174D-03	0.121D+01
LAB 8	0.1697D-01	0.5139D-06	0.717D-03	0.422D+01	0.1441D-05	0.120D-02	0.707D+01	0.8087D-06	0.899D-03	0.530D+01
LAB 10	0.1443D-01	0.7500D-10	0.866D-05	0.600D-01	-.9500D-09	-.500D+01	-.500D+01	0.9400D-08	0.970D-04	0.672D+00
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.1684D-01	0.1267D-06	0.356D-03	0.211D+01	0.3775D-06	0.614D-03	0.365D+01	0.2161D-07	0.147D-03	0.873D+00
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.1463D-01	0.1979D-08	0.445D-04	0.304D+00	0.4945D-08	0.703D-04	0.481D+00	0.7942D-08	0.891D-04	0.609D+00
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.1005D+00	0.3221D-02	0.568D-01	0.565D+02	0.9654D-02	0.983D-01	0.978D+02	0.7101D-04	0.843D-02	0.838D+01
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 89 SAMPLE RS										
LAB 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 8	0.1442D-02	0.4874D-06	0.698D-03	0.484D+02	0.1434D-05	0.120D-02	0.831D+02	0.2258D-06	0.475D-03	0.330D+02
LAB 10	0.8333D-04	0.1668D-11	0.129D-05	0.155D+01	0.2962D-11	0.172D-05	0.207D+01	0.1635D-10	0.404D-05	0.485D+01
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.1537D-03	0.2661D-09	0.163D-04	0.106D+02	0.7937D-09	0.282D-04	0.183D+02	0.3750D-10	0.612D-05	0.398D+01
LAB 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.2187D-03	0.2726D-08	0.522D-04	0.239D+02	0.8104D-08	0.900D-04	0.412D+02	0.5827D-09	0.241D-04	0.110D+02
LAB 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 19	0.6949D-01	0.2262D-02	0.476D-01	0.684D+02	0.6757D-02	0.822D-01	0.118D+03	0.2325D-03	0.152D-01	0.219D+02
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 9 SAMPLE AU										
LAB 2	0.2306D+00	0.1207D-06	0.347D-03	0.151D+00	0.2967D-06	0.545D-03	0.236D+00	0.5223D-06	0.723D-03	0.313D+00
LAB 3	0.2318D+00	0.6558D-07	0.256D-03	0.110D+00	0.1468D-06	0.383D-03	0.165D+00	0.3994D-06	0.632D-03	0.273D+00
LAB 4	0.2305D+00	0.2454D-05	0.157D-02	0.680D+00	0.7065D-05	0.266D-02	0.115D+01	0.2363D-05	0.154D-02	0.667D+00
LAB 5	0.2305D+00	0.4323D-05	0.208D-02	0.902D+00	0.1108D-04	0.333D-02	0.144D+01	0.1510D-04	0.389D-02	0.169D+01
LAB 6	0.2310D+00	0.1257D-07	0.112D-03	0.485D-01	-.9013D-07	-.500D+01	-.500D+01	0.1023D-05	0.101D-02	0.438D+00
LAB 7	0.2307D+00	0.3803D-06	0.617D-03	0.267D+00	0.9188D-06	0.959D-03	0.415D+00	0.1776D-05	0.133D-02	0.578D+00
LAB 8	0.2297D+00	0.2726D-06	0.522D-03	0.227D+00	-.1765D-05	-.500D+01	-.500D+01	0.2066D-04	0.455D-02	0.198D+01
LAB 10	0.2298D+00	0.4779D-07	0.219D-03	0.951D-01	0.1183D-06	0.344D-03	0.150D+00	0.2006D-06	0.448D-03	0.195D+00
LAB 12	0.2306D+00	0.1590D-07	0.126D-03	0.547D-01	-.3190D-07	-.500D+01	-.500D+01	0.6369D-06	0.798D-03	0.346D+00
LAB 13	0.2305D+00	0.9281D-07	0.305D-03	0.132D+00	0.2594D-06	0.509D-03	0.221D+00	0.1523D-06	0.390D-03	0.169D+00
LAB 14	0.2301D+00	0.2478D-06	0.498D-03	0.216D+00	0.6618D-06	0.814D-03	0.354D+00	0.6532D-06	0.808D-03	0.351D+00
LAB 15	0.2309D+00	0.2505D-06	0.500D-03	0.217D+00	0.5623D-06	0.750D-03	0.325D+00	0.1512D-05	0.123D-02	0.533D+00
LAB 16	0.2321D+00	0.1063D-06	0.326D-03	0.141D+00	0.2950D-06	0.543D-03	0.234D+00	0.1919D-06	0.438D-03	0.189D+00
LAB 17	0.2308D+00	0.1539D-06	0.392D-03	0.170D+00	0.3480D-06	0.590D-03	0.256D+00	0.9092D-06	0.954D-03	0.413D+00
LAB 18	0.2305D+00	0.1513D-07	0.123D-03	0.534D-01	0.9711D-08	0.985D-04	0.428D-01	0.2854D-06	0.534D-03	0.232D+00
LAB 19	0.2302D+00	0.1349D-07	0.116D-03	0.505D-01	0.9769D-08	0.988D-04	0.429D-01	0.2456D-06	0.496D-03	0.215D+00
LAB 20	0.2317D+00	0.7669D-06	0.876D-03	0.378D+00	0.1425D-05	0.119D-02	0.515D+00	0.7006D-05	0.265D-02	0.114D+01
LAB 21	0.2308D+00	0.1587D-06	0.398D-03	0.173D+00	0.3435D-06	0.586D-03	0.254D+00	0.1060D-05	0.103D-02	0.446D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 9 SAMPLE BU										
LAB 2	0.2306D+00	0.2189D-07	0.148D-03	0.642D-01	0.3602D-07	0.190D-03	0.823D-01	0.2373D-06	0.487D-03	0.211D+00
LAB 3	0.2306D+00	0.1925D-07	0.139D-03	0.602D-01	0.4199D-07	0.205D-03	0.889D-01	0.1261D-06	0.355D-03	0.154D+00
LAB 4	0.2293D+00	0.4870D-06	0.698D-03	0.304D+00	0.1048D-05	0.102D-02	0.446D+00	0.3303D-05	0.182D-02	0.793D+00
LAB 5	0.2308D+00	0.5090D-07	0.226D-03	0.978D-01	-.2691D-07	-.500D+01	-.500D+01	0.1437D-05	0.120D-02	0.519D+00
LAB 6	0.2310D+00	0.6892D-08	0.830D-04	0.359D-01	-.1523D-06	-.500D+01	-.500D+01	0.1384D-05	0.118D-02	0.509D+00
LAB 7	0.2299D+00	0.2799D-07	0.167D-03	0.728D-01	-.2417D-06	-.500D+01	-.500D+01	0.2605D-05	0.161D-02	0.702D+00
LAB 8	0.2275D+00	0.4288D-06	0.655D-03	0.288D+00	-.1257D-05	-.500D+01	-.500D+01	0.2035D-04	0.451D-02	0.198D+01
LAB 10	0.2293D+00	0.6895D-08	0.830D-04	0.362D-01	-.2091D-07	-.500D+01	-.500D+01	0.3328D-06	0.577D-03	0.252D+00
LAB 12	0.2306D+00	0.6911D-07	0.263D-03	0.114D+00	-.1637D-08	-.500D+01	-.500D+01	0.1672D-05	0.129D-02	0.561D+00
LAB 13	0.2300D+00	0.6294D-08	0.793D-04	0.345D-01	-.3939D-07	-.500D+01	-.500D+01	0.4662D-06	0.683D-03	0.297D+00
LAB 14	0.2309D+00	0.1004D-06	0.317D-03	0.137D+00	0.2151D-06	0.464D-03	0.201D+00	0.6884D-06	0.830D-03	0.359D+00
LAB 15	0.2305D+00	0.4606D-07	0.215D-03	0.931D-01	0.4494D-08	0.670D-04	0.291D-01	0.1069D-05	0.103D-02	0.449D+00
LAB 16	0.2316D+00	0.3663D-08	0.605D-04	0.261D-01	-.1153D-07	-.500D+01	-.500D+01	0.1802D-06	0.424D-03	0.183D+00
LAB 17	0.2307D+00	0.7180D-06	0.847D-03	0.367D+00	0.1843D-05	0.136D-02	0.589D+00	0.2489D-05	0.158D-02	0.684D+00
LAB 18	0.2303D+00	0.7652D-08	0.875D-04	0.380D-01	0.8232D-08	0.907D-04	0.394D-01	0.1178D-06	0.343D-03	0.149D+00
LAB 19	0.2299D+00	0.4424D-07	0.210D-03	0.915D-01	0.1160D-06	0.341D-03	0.148D+00	0.1340D-06	0.366D-03	0.159D+00
LAB 20	0.2295D+00	0.9637D-07	0.310D-03	0.135D+00	-.3718D-06	-.500D+01	-.500D+01	0.5287D-05	0.230D-02	0.100D+01
LAB 21	0.2306D+00	0.1525D-06	0.391D-03	0.169D+00	0.3403D-06	0.583D-03	0.253D+00	0.9374D-06	0.968D-03	0.420D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 9 SAMPLE RU										
LAB 2	0.2639D-01	0.3177D-10	0.564D-05	0.214D-01	-.5282D-08	-.500D+01	-.500D+01	0.4302D-07	0.207D-03	0.786D+00
LAB 3	0.2655D-01	0.8807D-09	0.297D-04	0.112D+00	-.1214D-08	-.500D+01	-.500D+01	0.3085D-07	0.176D-03	0.662D+00
LAB 4	0.2342D-01	0.3658D-07	0.191D-03	0.817D+00	0.1083D-06	0.329D-03	0.141D+01	0.1161D-07	0.108D-03	0.460D+00
LAB 5	0.2769D-01	0.5404D-06	0.735D-03	0.265D+01	0.1599D-05	0.126D-02	0.457D+01	0.1751D-06	0.418D-03	0.151D+01
LAB 6	0.2652D-01	0.4918D-09	0.222D-04	0.836D-01	-.4994D-08	-.500D+01	-.500D+01	0.5176D-07	0.228D-03	0.858D+00
LAB 7	0.2590D-01	0.7465D-09	0.273D-04	0.106D+00	-.1890D-08	-.500D+01	-.500D+01	0.3304D-07	0.182D-03	0.702D+00
LAB 8	0.2734D-01	0.5172D-07	0.227D-03	0.832D+00	0.1353D-07	0.116D-03	0.425D+00	0.1133D-05	0.106D-02	0.389D+01
LAB 10	0.2648D-01	0.2636D-08	0.513D-04	0.194D+00	0.4665D-08	0.683D-04	0.258D+00	0.2594D-07	0.161D-03	0.608D+00
LAB 12	0.2634D-01	0.7741D-09	0.278D-04	0.106D+00	0.3809D-09	0.195D-04	0.741D-01	0.1553D-07	0.125D-03	0.473D+00
LAB 13	0.2616D-01	0.4906D-09	0.222D-04	0.847D-01	-.8715D-09	-.500D+01	-.500D+01	0.1875D-07	0.137D-03	0.523D+00
LAB 14	0.2650D-01	0.2707D-07	0.165D-03	0.621D+00	0.8056D-07	0.284D-03	0.107D+01	0.5068D-08	0.712D-04	0.269D+00
LAB 15	0.2634D-01	0.1646D-07	0.128D-03	0.487D+00	0.4184D-07	0.205D-03	0.777D+00	0.6030D-07	0.246D-03	0.932D+00
LAB 16	0.2619D-01	0.8127D-09	0.285D-04	0.109D+00	0.2045D-08	0.452D-04	0.173D+00	0.3142D-08	0.561D-04	0.214D+00
LAB 17	0.2625D-01	0.6041D-08	0.777D-04	0.296D+00	0.1106D-07	0.105D-03	0.401D+00	0.5647D-07	0.238D-03	0.905D+00
LAB 18	0.2623D-01	0.3694D-09	0.192D-04	0.733D-01	0.9737D-09	0.312D-04	0.119D+00	0.1075D-08	0.328D-04	0.125D+00
LAB 19	0.2631D-01	0.1844D-08	0.429D-04	0.163D+00	0.3541D-08	0.595D-04	0.226D+00	0.1592D-07	0.126D-03	0.480D+00
LAB 20	0.2609D-01	0.3753D-07	0.194D-03	0.742D+00	0.7484D-07	0.274D-03	0.105D+01	0.3019D-06	0.549D-03	0.211D+01
LAB 21	0.2797D-01	0.5845D-09	0.242D-04	0.864D-01	-.1852D-09	-.500D+01	-.500D+01	0.1551D-07	0.125D-03	0.445D+00

LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 9 SAMPLE AS										
LAB 2	0.2351D+00	0.9590D-07	0.310D-03	0.132D+00	0.1770D-06	0.421D-03	0.179D+00	0.8855D-06	0.941D-03	0.400D+00
LAB 3	0.2355D+00	0.2028D-06	0.450D-03	0.191D+00	0.5679D-06	0.754D-03	0.320D+00	0.3246D-06	0.570D-03	0.242D+00
LAB 4	0.2286D+00	0.1344D-05	0.116D-02	0.507D+00	0.3039D-05	0.174D-02	0.763D+00	0.7945D-05	0.282D-02	0.123D+01
LAB 5	0.2340D+00	0.2225D-06	0.472D-03	0.202D+00	0.5098D-06	0.714D-03	0.305D+00	0.1262D-05	0.112D-02	0.480D+00
LAB 6	0.2353D+00	0.5943D-07	0.244D-03	0.104D+00	-.1423D-06	-.500D+01	-.500D+01	0.2564D-05	0.160D-02	0.681D+00
LAB 7	0.2351D+00	0.1443D-06	0.380D-03	0.162D+00	0.1820D-06	0.427D-03	0.181D+00	0.2007D-05	0.142D-02	0.602D+00
LAB 8	0.2328D+00	0.5731D-05	0.239D-02	0.103D+01	0.8929D-05	0.299D-02	0.128D+01	0.6611D-04	0.813D-02	0.349D+01
LAB 10	0.2349D+00	0.1129D-06	0.336D-03	0.143D+00	0.2749D-06	0.524D-03	0.223D+00	0.5106D-06	0.715D-03	0.304D+00
LAB 12	0.2345D+00	0.2678D-06	0.517D-03	0.221D+00	0.4364D-06	0.661D-03	0.282D+00	0.2935D-05	0.171D-02	0.730D+00
LAB 13	0.2337D+00	0.1794D-07	0.134D-03	0.573D-01	-.1569D-07	-.500D+01	-.500D+01	0.5561D-06	0.746D-03	0.319D+00
LAB 14	0.2341D+00	0.9411D-07	0.307D-03	0.131D+00	0.2307D-06	0.480D-03	0.205D+00	0.4128D-06	0.642D-03	0.274D+00
LAB 15	0.2337D+00	0.4918D-07	0.222D-03	0.949D-01	0.2391D-07	0.155D-03	0.662D-01	0.9892D-06	0.995D-03	0.426D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.2348D+00	0.1069D-05	0.103D-02	0.440D+00	0.3012D-05	0.174D-02	0.739D+00	0.1560D-05	0.125D-02	0.532D+00
LAB 18	0.2341D+00	0.1144D-06	0.338D-03	0.145D+00	0.3233D-06	0.569D-03	0.243D+00	0.1592D-06	0.399D-03	0.170D+00
LAB 19	0.2351D+00	0.1335D-07	0.116D-03	0.492D-01	-.9375D-07	-.500D+01	-.500D+01	0.1070D-05	0.103D-02	0.440D+00
LAB 20	0.2336D+00	0.3368D-06	0.580D-03	0.248D+00	0.8224D-06	0.907D-03	0.388D+00	0.1504D-05	0.123D-02	0.525D+00
LAB 21	0.2344D+00	0.1300D-06	0.361D-03	0.154D+00	0.2089D-06	0.457D-03	0.195D+00	0.1449D-05	0.120D-02	0.514D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 9 SAMPLE BS										
LAB 2	0.2350D+00	0.1599D-07	0.126D-03	0.538D-01	-.1634D-06	-.500D+01	-.500D+01	0.1691D-05	0.130D-02	0.553D+00
LAB 3	0.2364D+00	0.2174D-06	0.466D-03	0.197D+00	0.6183D-06	0.786D-03	0.333D+00	0.2709D-06	0.520D-03	0.220D+00
LAB 4	0.2348D+00	0.6269D-06	0.792D-03	0.337D+00	0.1004D-05	0.100D-02	0.427D+00	0.7014D-05	0.265D-02	0.113D+01
LAB 5	0.2336D+00	0.5869D-06	0.766D-03	0.328D+00	0.1525D-05	0.123D-02	0.529D+00	0.1890D-05	0.137D-02	0.589D+00
LAB 6	0.2333D+00	0.2718D-05	0.165D-02	0.707D+00	0.7669D-05	0.277D-02	0.119D+01	0.3877D-05	0.197D-02	0.844D+00
LAB 7	0.2327D+00	0.3219D-06	0.567D-03	0.244D+00	0.6646D-06	0.815D-03	0.350D+00	0.2409D-05	0.155D-02	0.667D+00
LAB 8	0.2375D+00	0.2085D-05	0.144D-02	0.608D+00	-.3435D-05	-.500D+01	-.500D+01	0.7752D-04	0.880D-02	0.371D+01
LAB 10	0.2340D+00	0.3917D-07	0.198D-03	0.846D-01	0.9184D-07	0.303D-03	0.130D+00	0.2053D-06	0.453D-03	0.194D+00
LAB 12	0.2342D+00	0.1064D-07	0.103D-03	0.440D-01	-.1084D-06	-.500D+01	-.500D+01	0.1123D-05	0.106D-02	0.452D+00
LAB 13	0.2341D+00	0.4254D-08	0.652D-04	0.279D-01	-.2463D-07	-.500D+01	-.500D+01	0.2991D-06	0.547D-03	0.234D+00
LAB 14	0.2339D+00	0.1535D-06	0.392D-03	0.167D+00	0.4294D-06	0.655D-03	0.280D+00	0.2480D-06	0.498D-03	0.213D+00
LAB 15	0.2325D+00	0.2165D-05	0.147D-02	0.633D+00	0.6087D-05	0.247D-02	0.106D+01	0.3259D-05	0.181D-02	0.776D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.2345D+00	0.5002D-07	0.224D-03	0.954D-01	0.9917D-07	0.315D-03	0.134D+00	0.4071D-06	0.638D-03	0.272D+00
LAB 18	0.2335D+00	0.1128D-06	0.336D-03	0.144D+00	0.2979D-06	0.546D-03	0.234D+00	0.3227D-06	0.568D-03	0.243D+00
LAB 19	0.2351D+00	0.2896D-07	0.170D-03	0.724D-01	0.1655D-07	0.129D-03	0.547D-01	0.5626D-06	0.750D-03	0.319D+00
LAB 20	0.2355D+00	0.1304D-04	0.361D-02	0.153D+01	0.3693D-04	0.608D-02	0.258D+01	0.1761D-04	0.420D-02	0.178D+01
LAB 21	0.2342D+00	0.7965D-07	0.282D-03	0.121D+00	0.1933D-06	0.440D-03	0.188D+00	0.3655D-06	0.605D-03	0.258D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 9 SAMPLE RS										
LAB 2	0.3324D-01	0.2765D-08	0.526D-04	0.158D+00	-.1055D-07	-.500D+01	-.500D+01	0.1507D-06	0.388D-03	0.117D+01
LAB 3	0.3324D-01	0.2787D-08	0.528D-04	0.159D+00	0.5609D-08	0.749D-04	0.225D+00	0.2203D-07	0.148D-03	0.446D+00
LAB 4	0.3292D-01	0.1536D-06	0.392D-03	0.119D+01	0.4512D-06	0.672D-03	0.204D+01	0.7744D-07	0.278D-03	0.845D+00
LAB 5	0.3338D-01	0.6299D-07	0.251D-03	0.752D+00	0.1658D-06	0.407D-03	0.122D+01	0.1855D-06	0.431D-03	0.129D+01
LAB 6	0.3350D-01	0.1472D-08	0.384D-04	0.115D+00	-.1713D-07	-.500D+01	-.500D+01	0.1724D-06	0.415D-03	0.124D+01
LAB 7	0.3275D-01	0.8877D-07	0.298D-03	0.910D+00	0.2448D-06	0.495D-03	0.151D+01	0.1723D-06	0.415D-03	0.127D+01
LAB 8	0.3587D-01	0.2453D-05	0.157D-02	0.437D+01	0.6807D-05	0.261D-02	0.727D+01	0.4423D-05	0.210D-02	0.586D+01
LAB 10	0.3289D-01	0.9595D-09	0.310D-04	0.942D-01	-.8936D-09	-.500D+01	-.500D+01	0.3018D-07	0.174D-03	0.528D+00
LAB 12	0.3290D-01	0.3732D-08	0.611D-04	0.186D+00	0.5625D-08	0.750D-04	0.228D+00	0.4458D-07	0.211D-03	0.642D+00
LAB 13	0.3277D-01	0.1181D-07	0.109D-03	0.332D+00	0.3078D-07	0.175D-03	0.535D+00	0.3722D-07	0.193D-03	0.589D+00
LAB 14	0.3312D-01	0.5642D-08	0.751D-04	0.227D+00	0.1616D-07	0.127D-03	0.384D+00	0.6131D-08	0.783D-04	0.236D+00
LAB 15	0.3288D-01	0.1689D-07	0.130D-03	0.395D+00	0.4423D-07	0.210D-03	0.640D+00	0.5155D-07	0.227D-03	0.690D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.3294D-01	0.7338D-08	0.857D-04	0.260D+00	0.2122D-07	0.146D-03	0.442D+00	0.6344D-08	0.796D-04	0.242D+00
LAB 18	0.3291D-01	0.6141D-09	0.248D-04	0.753D-01	0.1506D-08	0.388D-04	0.118D+00	0.2693D-08	0.519D-04	0.158D+00
LAB 19	0.3303D-01	0.1769D-08	0.421D-04	0.127D+00	0.4445D-08	0.667D-04	0.202D+00	0.6903D-08	0.831D-04	0.252D+00
LAB 20	0.3227D-01	0.1786D-07	0.134D-03	0.414D+00	0.2748D-07	0.166D-03	0.514D+00	0.2089D-06	0.457D-03	0.142D+01
LAB 21	0.6662D-01	0.1040D-06	0.322D-03	0.484D+00	-.2316D-06	-.500D+01	-.500D+01	0.3517D-05	0.188D-02	0.282D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 19 SAMPLE AU										
LAB 2	0.1328D+00	0.2385D-07	0.154D-03	0.116D+00	-.1690D-06	-.500D+01	-.500D+01	0.1925D-05	0.139D-02	0.104D+01
LAB 3	0.1292D+00	0.3502D-06	0.592D-03	0.458D+00	0.1039D-05	0.102D-02	0.789D+00	0.9300D-07	0.305D-03	0.236D+00
LAB 4	0.1284D+00	0.4573D-06	0.676D-03	0.526D+00	0.1076D-05	0.104D-02	0.808D+00	0.2367D-05	0.154D-02	0.120D+01
LAB 5	0.1251D+00	0.1459D-05	0.121D-02	0.965D+00	0.3618D-05	0.190D-02	0.152D+01	0.6074D-05	0.246D-02	0.197D+01

LAB 6	0.1277D+00	0.9342D-08	0.967D-04	0.757D-01	-.3327D-07	-.500D+01	-.500D+01	0.4904D-06	0.700D-03	0.548D+00
LAB 7	0.1271D+00	0.6425D-06	0.802D-03	0.630D+00	0.1829D-05	0.135D-02	0.106D+01	0.7899D-06	0.889D-03	0.699D+00
LAB 8	0.1292D+00	0.5340D-06	0.731D-03	0.566D+00	0.6387D-07	0.253D-03	0.196D+00	0.1230D-04	0.351D-02	0.272D+01
LAB 10	0.1272D+00	0.3542D-07	0.188D-03	0.148D+00	0.9513D-07	0.308D-03	0.242D+00	0.8890D-07	0.298D-03	0.234D+00
LAB 12	0.1277D+00	0.4772D-07	0.218D-03	0.171D+00	0.7745D-08	0.880D-04	0.689D-01	0.1083D-05	0.104D-02	0.815D+00
LAB 13	0.1268D+00	0.8683D-08	0.932D-04	0.735D-01	-.5728D-08	-.500D+01	-.500D+01	0.2542D-06	0.504D-03	0.398D+00
LAB 14	0.1262D+00	0.2075D-07	0.144D-03	0.114D+00	0.9954D-08	0.998D-04	0.790D-01	0.4184D-06	0.647D-03	0.512D+00
LAB 15	0.1276D+00	0.8637D-07	0.294D-03	0.230D+00	0.1184D-06	0.344D-03	0.270D+00	0.1125D-05	0.106D-02	0.832D+00
LAB 16	0.1282D+00	0.7094D-07	0.266D-03	0.208D+00	0.1965D-06	0.443D-03	0.346D+00	0.1308D-06	0.362D-03	0.282D+00
LAB 17	0.1272D+00	0.2534D-07	0.159D-03	0.125D+00	0.3544D-07	0.188D-03	0.148D+00	0.3245D-06	0.570D-03	0.448D+00
LAB 18	0.1276D+00	0.1795D-06	0.424D-03	0.332D+00	0.5258D-06	0.725D-03	0.568D+00	0.1012D-06	0.318D-03	0.249D+00
LAB 19	0.1263D+00	0.8453D-07	0.291D-03	0.230D+00	0.2346D-06	0.484D-03	0.383D+00	0.1520D-06	0.390D-03	0.309D+00
LAB 20	0.1273D+00	0.2257D-06	0.475D-03	0.373D+00	0.2546D-06	0.505D-03	0.396D+00	0.3379D-05	0.184D-02	0.144D+01
LAB 21	0.1261D+00	0.3461D-06	0.588D-03	0.466D+00	0.8685D-06	0.932D-03	0.739D+00	0.1358D-05	0.117D-02	0.924D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 19 SAMPLE BU										
LAB 2	0.1307D+00	0.1037D-05	0.102D-02	0.779D+00	0.2965D-05	0.172D-02	0.132D+01	0.1165D-05	0.108D-02	0.826D+00
LAB 3	0.1277D+00	0.8324D-08	0.912D-04	0.714D-01	0.1645D-07	0.128D-03	0.100D+00	0.6819D-07	0.261D-03	0.204D+00
LAB 4	0.1272D+00	0.6437D-08	0.802D-04	0.631D-01	-.9169D-07	-.500D+01	-.500D+01	0.8880D-06	0.942D-03	0.741D+00
LAB 5	0.1266D+00	0.8152D-07	0.286D-03	0.226D+00	0.1722D-06	0.415D-03	0.328D+00	0.5788D-06	0.761D-03	0.601D+00
LAB 6	0.1276D+00	0.2034D-07	0.143D-03	0.112D+00	-.8533D-07	-.500D+01	-.500D+01	0.1171D-05	0.108D-02	0.848D+00
LAB 7	0.1273D+00	0.1491D-06	0.386D-03	0.303D+00	0.1818D-06	0.426D-03	0.335D+00	0.2124D-05	0.146D-02	0.115D+01
LAB 8	0.1258D+00	0.4967D-07	0.223D-03	0.177D+00	-.1053D-05	-.500D+01	-.500D+01	0.9616D-05	0.310D-02	0.246D+01
LAB 10	0.1268D+00	0.2709D-08	0.520D-04	0.411D-01	-.2021D-07	-.500D+01	-.500D+01	0.2267D-06	0.476D-03	0.376D+00
LAB 12	0.1276D+00	0.3115D-07	0.176D-03	0.138D+00	0.3771D-07	0.194D-03	0.152D+00	0.4460D-06	0.668D-03	0.524D+00
LAB 13	0.1269D+00	0.3196D-07	0.179D-03	0.141D+00	0.6559D-07	0.256D-03	0.202D+00	0.2422D-06	0.492D-03	0.388D+00
LAB 14	0.1274D+00	0.1177D-06	0.343D-03	0.269D+00	0.3283D-06	0.573D-03	0.450D+00	0.1983D-06	0.445D-03	0.350D+00
LAB 15	0.1272D+00	0.6932D-07	0.263D-03	0.207D+00	0.1284D-06	0.358D-03	0.282D+00	0.6363D-06	0.798D-03	0.627D+00
LAB 16	0.1273D+00	0.5539D-08	0.744D-04	0.585D-01	-.2788D-08	-.500D+01	-.500D+01	0.1552D-06	0.394D-03	0.310D+00
LAB 17	0.1276D+00	0.1555D-07	0.125D-03	0.977D-01	-.5343D-07	-.500D+01	-.500D+01	0.8005D-06	0.895D-03	0.701D+00
LAB 18	0.1270D+00	0.8934D-09	0.299D-04	0.235D-01	-.8974D-08	-.500D+01	-.500D+01	0.9323D-07	0.305D-03	0.241D+00
LAB 19	0.1264D+00	0.3300D-07	0.182D-03	0.144D+00	0.6361D-07	0.252D-03	0.200D+00	0.2830D-06	0.532D-03	0.421D+00
LAB 20	0.1262D+00	0.4096D-06	0.640D-03	0.507D+00	0.6313D-06	0.795D-03	0.630D+00	0.4781D-05	0.219D-02	0.173D+01
LAB 21	0.1262D+00	0.1101D-06	0.332D-03	0.263D+00	0.2361D-06	0.486D-03	0.385D+00	0.7533D-06	0.868D-03	0.687D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 19 SAMPLE RU										
LAB 2	0.8246D-03	0.9155D-09	0.303D-04	0.367D+01	0.2317D-08	0.481D-04	0.584D+01	0.3439D-08	0.586D-04	0.711D+01
LAB 3	0.7314D-03	0.8067D-11	0.284D-05	0.388D+00	-.9618D-11	-.500D+01	-.500D+01	0.2706D-09	0.164D-04	0.225D+01
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.8439D-03	0.7972D-09	0.282D-04	0.335D+01	0.1899D-08	0.436D-04	0.516D+01	0.3941D-08	0.628D-04	0.744D+01
LAB 6	0.7909D-03	0.1710D-09	0.131D-04	0.165D+01	0.3219D-09	0.179D-04	0.227D+01	0.1528D-08	0.391D-04	0.494D+01
LAB 7	0.7984D-03	0.1669D-09	0.129D-04	0.162D+01	0.2543D-09	0.159D-04	0.200D+01	0.1971D-08	0.444D-04	0.556D+01
LAB 8	0.9920D-03	0.1383D-08	0.372D-04	0.375D+01	-.1106D-09	-.500D+01	-.500D+01	0.3408D-07	0.185D-03	0.186D+02
LAB 10	0.7441D-03	0.2276D-10	0.477D-05	0.641D+00	0.3949D-10	0.628D-05	0.845D+00	0.2304D-09	0.152D-04	0.204D+01
LAB 12	0.7439D-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.7138D-03	0.3296D-10	0.574D-05	0.804D+00	-.9635D-11	-.500D+01	-.500D+01	0.8682D-09	0.295D-04	0.413D+01
LAB 14	0.7593D-03	0.1939D-09	0.139D-04	0.183D+01	0.5780D-09	0.240D-04	0.317D+01	0.2921D-10	0.540D-05	0.712D+00
LAB 15	0.7820D-03	0.1172D-09	0.108D-04	0.138D+01	0.2984D-09	0.173D-04	0.221D+01	0.4252D-09	0.206D-04	0.264D+01
LAB 16	0.7375D-03	0.7006D-10	0.837D-05	0.113D+01	0.2018D-09	0.142D-04	0.193D+01	0.6665D-10	0.816D-05	0.111D+01
LAB 17	0.7245D-03	0.3191D-10	0.565D-05	0.780D+00	0.8715D-10	0.934D-05	0.129D+01	0.6870D-10	0.829D-05	0.114D+01
LAB 18	0.7446D-03	0.3461D-11	0.186D-05	0.250D+00	0.5021D-11	0.224D-05	0.301D+00	0.4290D-10	0.655D-05	0.880D+00
LAB 19	0.7476D-03	0.2822D-10	0.531D-05	0.711D+00	0.7703D-10	0.878D-05	0.117D+01	0.6102D-10	0.781D-05	0.104D+01
LAB 20	0.6795D-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.1333D-02	0.3417D-09	0.185D-04	0.139D+01	0.8982D-09	0.300D-04	0.225D+01	0.1016D-08	0.319D-04	0.239D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 19 SAMPLE AS										
LAB 2	0.1299D+00	0.1446D-05	0.120D-02	0.925D+00	0.4117D-05	0.203D-02	0.156D+01	0.1765D-05	0.133D-02	0.102D+01
LAB 3	0.1263D+00	0.1920D-06	0.438D-03	0.347D+00	0.5718D-06	0.756D-03	0.599D+00	0.3305D-07	0.182D-03	0.144D+00
LAB 4	0.1230D+00	0.1419D-04	0.377D-02	0.306D+01	0.4218D-04	0.649D-02	0.528D+01	0.3203D-05	0.179D-02	0.146D+01
LAB 5	0.1257D+00	0.3858D-06	0.621D-03	0.494D+00	0.9948D-06	0.997D-03	0.793D+00	0.1301D-05	0.114D-02	0.907D+00
LAB 6	0.1270D+00	0.4761D-07	0.218D-03	0.172D+00	-.4716D-06	-.500D+01	-.500D+01	0.4915D-05	0.222D-02	0.175D+01
LAB 7	0.1274D+00	0.8955D-07	0.299D-03	0.235D+00	0.1408D-06	0.375D-03	0.295D+00	0.1023D-05	0.101D-02	0.794D+00
LAB 8	0.1289D+00	0.2859D-05	0.169D-02	0.131D+01	0.2949D-05	0.172D-02	0.133D+01	0.4503D-04	0.671D-02	0.521D+01
LAB 10	0.1281D+00	0.4069D-06	0.638D-03	0.498D+00	0.1197D-05	0.109D-02	0.854D+00	0.1924D-06	0.439D-03	0.342D+00
LAB 12	0.1268D+00	0.2538D-07	0.159D-03	0.126D+00	-.7488D-07	-.500D+01	-.500D+01	0.1208D-05	0.110D-02	0.867D+00
LAB 13	0.1261D+00	0.7087D-07	0.266D-03	0.211D+00	0.1938D-06	0.440D-03	0.349D+00	0.1502D-06	0.388D-03	0.307D+00

LAB 14	0.1279D+00	0.4670D-07	0.216D-03	0.169D+00	0.1058D-06	0.325D-03	0.254D+00	0.2740D-06	0.523D-03	0.409D+00
LAB 15	0.1273D+00	0.3691D-09	0.192D-04	0.151D-01	-.6475D-07	-.500D+01	-.500D+01	0.5269D-06	0.726D-03	0.570D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.1263D+00	0.2544D-06	0.504D-03	0.399D+00	0.7074D-06	0.841D-03	0.666D+00	0.4460D-06	0.668D-03	0.529D+00
LAB 18	0.1267D+00	0.5429D-07	0.233D-03	0.184D+00	0.1531D-06	0.391D-03	0.309D+00	0.7825D-07	0.280D-03	0.221D+00
LAB 19	0.1268D+00	0.5917D-07	0.243D-03	0.192D+00	0.1126D-06	0.336D-03	0.265D+00	0.5194D-06	0.721D-03	0.569D+00
LAB 20	0.1251D+00	0.4483D-06	0.670D-03	0.535D+00	0.1072D-05	0.104D-02	0.827D+00	0.2182D-05	0.148D-02	0.118D+01
LAB 21	0.1255D+00	0.5313D-07	0.230D-03	0.184D+00	0.7942D-07	0.282D-03	0.225D+00	0.6397D-06	0.800D-03	0.637D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 19 SAMPLE BS										
LAB 2	0.1344D+00	0.3277D-06	0.572D-03	0.426D+00	-.4153D-06	-.500D+01	-.500D+01	0.1119D-04	0.334D-02	0.249D+01
LAB 3	0.1269D+00	0.2864D-07	0.169D-03	0.133D+00	0.7554D-07	0.275D-03	0.217D+00	0.8299D-07	0.288D-03	0.227D+00
LAB 4	0.1264D+00	0.1501D-06	0.387D-03	0.307D+00	0.2496D-06	0.500D-03	0.395D+00	0.1606D-05	0.127D-02	0.100D+01
LAB 5	0.1251D+00	0.3566D-06	0.597D-03	0.477D+00	0.9216D-06	0.960D-03	0.767D+00	0.1185D-05	0.109D-02	0.870D+00
LAB 6	0.1262D+00	0.1512D-05	0.123D-02	0.974D+00	0.4010D-05	0.200D-02	0.159D+01	0.4203D-05	0.205D-02	0.162D+01
LAB 7	0.1256D+00	0.2781D-06	0.527D-03	0.420D+00	0.6811D-06	0.825D-03	0.657D+00	0.1227D-05	0.111D-02	0.882D+00
LAB 8	0.1276D+00	0.3029D-05	0.174D-02	0.136D+01	0.5831D-05	0.241D-02	0.189D+01	0.2606D-04	0.510D-02	0.400D+01
LAB 10	0.1270D+00	0.8822D-07	0.297D-03	0.234D+00	0.2587D-06	0.509D-03	0.401D+00	0.4735D-07	0.218D-03	0.171D+00
LAB 12	0.1268D+00	0.1314D-07	0.115D-03	0.904D-01	-.2110D-07	-.500D+01	-.500D+01	0.4840D-06	0.696D-03	0.549D+00
LAB 13	0.1259D+00	0.1081D-06	0.329D-03	0.261D+00	0.2993D-06	0.547D-03	0.434D+00	0.1994D-06	0.447D-03	0.355D+00
LAB 14	0.1275D+00	0.6534D-07	0.256D-03	0.201D+00	0.1822D-06	0.427D-03	0.335D+00	0.1108D-06	0.333D-03	0.261D+00
LAB 15	0.1270D+00	0.2461D-06	0.496D-03	0.391D+00	0.5726D-06	0.757D-03	0.596D+00	0.1325D-05	0.115D-02	0.907D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.1267D+00	0.3710D-07	0.193D-03	0.152D+00	0.7905D-07	0.281D-03	0.222D+00	0.2581D-06	0.508D-03	0.401D+00
LAB 18	0.1262D+00	0.2358D-07	0.154D-03	0.122D+00	0.4815D-07	0.219D-03	0.174D+00	0.1808D-06	0.425D-03	0.337D+00
LAB 19	0.1267D+00	0.4035D-07	0.201D-03	0.159D+00	0.6614D-07	0.257D-03	0.203D+00	0.4393D-06	0.663D-03	0.523D+00
LAB 20	0.1262D+00	0.8482D-05	0.291D-02	0.231D+01	0.2494D-04	0.499D-02	0.396D+01	0.4088D-05	0.202D-02	0.160D+01
LAB 21	0.1247D+00	0.9483D-07	0.308D-03	0.247D+00	0.2467D-06	0.497D-03	0.398D+00	0.3024D-06	0.550D-03	0.441D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 19 SAMPLE RS										
LAB 2	0.2463D-02	0.1442D-07	0.120D-03	0.488D+01	0.3594D-07	0.190D-03	0.770D+01	0.5863D-07	0.242D-03	0.983D+01
LAB 3	0.1968D-02	0.8750D-08	0.935D-04	0.475D+01	0.2575D-07	0.160D-03	0.815D+01	0.4008D-08	0.633D-04	0.322D+01
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.2065D-02	0.1092D-08	0.330D-04	0.160D+01	0.2647D-08	0.514D-04	0.249D+01	0.5033D-08	0.709D-04	0.344D+01
LAB 6	0.2010D-02	0.3767D-09	0.194D-04	0.966D+00	0.6219D-09	0.249D-04	0.124D+01	0.4066D-08	0.638D-04	0.317D+01
LAB 7	0.2037D-02	0.7680D-09	0.277D-04	0.136D+01	0.1309D-08	0.362D-04	0.178D+01	0.7961D-08	0.892D-04	0.438D+01
LAB 8	0.2348D-02	0.7055D-08	0.840D-04	0.358D+01	0.1356D-07	0.116D-03	0.496D+01	0.6087D-07	0.247D-03	0.105D+02
LAB 10	0.2026D-02	0.5048D-10	0.710D-05	0.351D+00	-.4039D-10	-.500D+01	-.500D+01	0.1535D-08	0.392D-04	0.193D+01
LAB 12	0.2157D-02	0.4069D-09	0.202D-04	0.935D+00	0.8722D-10	0.934D-05	0.433D+00	0.9067D-08	0.952D-04	0.441D+01
LAB 13	0.1927D-02	0.2300D-08	0.480D-04	0.249D+01	0.6197D-08	0.787D-04	0.409D+01	0.5634D-08	0.751D-04	0.390D+01
LAB 14	0.2044D-02	0.6594D-11	0.257D-05	0.126D+00	-.9891D-10	-.500D+01	-.500D+01	0.9495D-09	0.308D-04	0.151D+01
LAB 15	0.2021D-02	0.4695D-08	0.685D-04	0.339D+01	0.1259D-07	0.112D-03	0.555D+01	0.1198D-07	0.109D-03	0.542D+01
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.2010D-02	0.8635D-10	0.929D-05	0.462D+00	0.1970D-09	0.140D-04	0.698D+00	0.4967D-09	0.223D-04	0.111D+01
LAB 18	0.2011D-02	0.1782D-10	0.422D-05	0.210D+00	0.4254D-10	0.652D-05	0.324D+00	0.8749D-10	0.935D-05	0.465D+00
LAB 19	0.2040D-02	0.1040D-10	0.323D-05	0.158D+00	-.1089D-10	-.500D+01	-.500D+01	0.3368D-09	0.184D-04	0.900D+00
LAB 20	0.1737D-02	0.2161D-08	0.465D-04	0.268D+01	0.6015D-08	0.776D-04	0.447D+01	0.3756D-08	0.613D-04	0.353D+01
LAB 21	0.9146D-02	0.1657D-09	0.129D-04	0.141D+00	-.4282D-06	-.500D+01	-.500D+01	0.3428D-05	0.185D-02	0.202D+02
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 29 SAMPLE AU										
LAB 2	0.2345D-01	0.1058D-07	0.103D-03	0.439D+00	0.1681D-07	0.130D-03	0.553D+00	0.1195D-06	0.346D-03	0.147D+01
LAB 3	0.2314D-01	0.1580D-08	0.397D-04	0.172D+00	0.3142D-08	0.561D-04	0.242D+00	0.1278D-07	0.113D-03	0.489D+00
LAB 4	0.2271D-01	0.1915D-06	0.438D-03	0.193D+01	0.5646D-06	0.751D-03	0.331D+01	0.7792D-07	0.279D-03	0.123D+01
LAB 5	0.2266D-01	0.8929D-07	0.299D-03	0.132D+01	0.1727D-06	0.416D-03	0.183D+01	0.7615D-06	0.873D-03	0.385D+01
LAB 6	0.2308D-01	0.1773D-09	0.133D-04	0.577D-01	-.9080D-08	-.500D+01	-.500D+01	0.7690D-07	0.277D-03	0.120D+01
LAB 7	0.2305D-01	0.8507D-09	0.292D-04	0.127D+00	-.5060D-08	-.500D+01	-.500D+01	0.6089D-07	0.247D-03	0.107D+01
LAB 8	0.2783D-01	0.2203D-05	0.148D-02	0.533D+01	0.6503D-05	0.255D-02	0.916D+01	0.8535D-06	0.924D-03	0.332D+01
LAB 10	0.2287D-01	0.1090D-08	0.330D-04	0.144D+00	0.1334D-08	0.365D-04	0.160D+00	0.1548D-07	0.124D-03	0.544D+00
LAB 12	0.2289D-01	0.5613D-08	0.749D-04	0.327D+00	0.9538D-08	0.977D-04	0.427D+00	0.5841D-07	0.242D-03	0.106D+01
LAB 13	0.2261D-01	0.9065D-08	0.952D-04	0.421D+00	0.2634D-07	0.162D-03	0.718D+00	0.6857D-08	0.828D-04	0.366D+00
LAB 14	0.2280D-01	0.2168D-07	0.147D-03	0.646D+00	0.6381D-07	0.253D-03	0.111D+01	0.9940D-08	0.997D-04	0.437D+00
LAB 15	0.2305D-01	0.6476D-08	0.805D-04	0.349D+00	0.5446D-08	0.738D-04	0.320D+00	0.1118D-06	0.334D-03	0.145D+01
LAB 16	0.2304D-01	0.1215D-11	0.110D-05	0.479D-02	-.4180D-09	-.500D+01	-.500D+01	0.3373D-08	0.581D-04	0.252D+00
LAB 17	0.2284D-01	0.1580D-08	0.397D-04	0.174D+00	0.4055D-08	0.637D-04	0.279D+00	0.5474D-08	0.740D-04	0.324D+00
LAB 18	0.2297D-01	0.1603D-08	0.400D-04	0.174D+00	0.3171D-08	0.563D-04	0.245D+00	0.1309D-07	0.114D-03	0.498D+00
LAB 19	0.2255D-01	0.5866D-09	0.242D-04	0.107D+00	-.7164D-09	-.500D+01	-.500D+01	0.1981D-07	0.141D-03	0.624D+00

LAB 20	0.2269D-01	0.7911D-07	0.281D-03	0.124D+01	0.1988D-06	0.446D-03	0.197D+01	0.3080D-06	0.555D-03	0.245D+01
LAB 21	0.2416D-01	0.8561D-07	0.293D-03	0.121D+01	0.2248D-06	0.474D-03	0.196D+01	0.2560D-06	0.506D-03	0.209D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 29 SAMPLE BU										
LAB 2	0.2331D-01	0.6059D-08	0.778D-04	0.334D+00	0.7299D-08	0.854D-04	0.367D+00	0.8702D-07	0.295D-03	0.127D+01
LAB 3	0.2330D-01	0.3012D-08	0.549D-04	0.236D+00	0.6175D-08	0.786D-04	0.337D+00	0.2289D-07	0.151D-03	0.649D+00
LAB 4	0.2247D-01	0.8130D-07	0.285D-03	0.127D+01	0.2390D-06	0.489D-03	0.218D+01	0.3917D-07	0.198D-03	0.881D+00
LAB 5	0.2262D-01	0.1580D-08	0.397D-04	0.176D+00	-.2421D-07	-.500D+01	-.500D+01	0.2316D-06	0.481D-03	0.213D+01
LAB 6	0.2305D-01	0.4319D-08	0.657D-04	0.285D+00	0.5108D-08	0.715D-04	0.310D+00	0.6279D-07	0.251D-03	0.109D+01
LAB 7	0.2288D-01	0.1783D-07	0.134D-03	0.584D+00	0.4513D-07	0.212D-03	0.929D+00	0.6685D-07	0.259D-03	0.113D+01
LAB 8	0.2373D-01	0.3991D-07	0.200D-03	0.842D+00	0.6404D-07	0.253D-03	0.107D+01	0.4456D-06	0.668D-03	0.281D+01
LAB 10	0.2287D-01	0.4882D-09	0.221D-04	0.966D-01	-.7091D-10	-.500D+01	-.500D+01	0.1228D-07	0.111D-03	0.485D+00
LAB 12	0.2303D-01	0.1776D-08	0.421D-04	0.183D+00	-.9090D-08	-.500D+01	-.500D+01	0.1153D-06	0.340D-03	0.147D+01
LAB 13	0.2278D-01	0.4437D-08	0.666D-04	0.292D+00	0.8681D-08	0.932D-04	0.409D+00	0.3704D-07	0.192D-03	0.845D+00
LAB 14	0.2301D-01	0.5440D-08	0.738D-04	0.321D+00	0.1419D-07	0.119D-03	0.518D+00	0.1703D-07	0.131D-03	0.567D+00
LAB 15	0.2298D-01	0.1059D-08	0.325D-04	0.142D+00	-.2433D-08	-.500D+01	-.500D+01	0.4488D-07	0.212D-03	0.922D+00
LAB 16	0.2286D-01	0.1813D-08	0.426D-04	0.186D+00	0.4532D-08	0.673D-04	0.294D+00	0.7254D-08	0.852D-04	0.373D+00
LAB 17	0.2290D-01	0.1684D-08	0.410D-04	0.179D+00	0.1806D-08	0.425D-04	0.186D+00	0.2596D-07	0.161D-03	0.704D+00
LAB 18	0.2298D-01	0.2677D-08	0.517D-04	0.225D+00	0.7075D-08	0.841D-04	0.366D+00	0.7654D-08	0.875D-04	0.381D+00
LAB 19	0.2255D-01	0.1627D-09	0.128D-04	0.566D-01	-.1587D-08	-.500D+01	-.500D+01	0.1660D-07	0.129D-03	0.571D+00
LAB 20	0.2131D-01	0.4429D-06	0.666D-03	0.312D+01	0.1178D-05	0.109D-02	0.509D+01	0.1205D-05	0.110D-02	0.515D+01
LAB 21	0.2343D-01	0.3051D-08	0.552D-04	0.236D+00	-.2703D-08	-.500D+01	-.500D+01	0.9485D-07	0.308D-03	0.131D+01
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 29 SAMPLE RU										
LAB 2	0.5509D-04	0.1122D-09	0.106D-04	0.192D+02	0.3303D-09	0.182D-04	0.330D+02	0.4987D-10	0.706D-05	0.128D+02
LAB 3	0.3117D-04	0.7575D-11	0.275D-05	0.883D+01	0.2027D-10	0.450D-05	0.144D+02	0.1961D-10	0.443D-05	0.142D+02
LAB 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 6	0.9997D-04	0.7958D-10	0.892D-05	0.892D+01	0.2055D-09	0.143D-04	0.143D+02	0.2562D-09	0.163D-04	0.163D+02
LAB 7	0.2417D-04	0.1163D-10	0.341D-05	0.141D+02	0.2046D-10	0.452D-05	0.187D+02	0.1155D-09	0.107D-04	0.445D+02
LAB 8	0.3000D-03	0.3333D-08	0.577D-04	0.192D+02	0.1000D-07	0.100D-03	0.333D+02	0.1093D-39	0.105D-19	0.349D-14
LAB 10	0.3229D-04	0.1580D-12	0.397D-06	0.123D+01	-.1403D-11	-.500D+01	-.500D+01	0.1502D-10	0.388D-05	0.120D+02
LAB 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 14	0.2917D-04	0.6944D-12	0.833D-06	0.286D+01	0.1190D-11	0.109D-05	0.374D+01	0.7143D-11	0.267D-05	0.916D+01
LAB 15	0.4954D-04	0.2625D-09	0.162D-04	0.327D+02	0.7824D-09	0.280D-04	0.565D+02	0.4093D-10	0.640D-05	0.129D+02
LAB 16	0.3450D-04	0.2505D-11	0.158D-05	0.459D+01	0.7041D-11	0.265D-05	0.769D+01	0.3798D-11	0.195D-05	0.565D+01
LAB 17	0.3037D-04	0.1005D-11	0.100D-05	0.330D+01	0.2246D-11	0.150D-05	0.493D+01	0.6161D-11	0.248D-05	0.817D+01
LAB 18	0.4611D-04	0.3444D-10	0.587D-05	0.127D+02	0.1024D-09	0.101D-04	0.219D+02	0.7229D-11	0.269D-05	0.583D+01
LAB 19	0.5076D-04	0.4810D-12	0.694D-06	0.137D+01	0.1289D-11	0.114D-05	0.224D+01	0.1232D-11	0.111D-05	0.219D+01
LAB 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 29 SAMPLE AS										
LAB 2	0.1302D+01	0.8778D-05	0.296D-02	0.228D+00	0.2371D-04	0.487D-02	0.374D+00	0.2102D-04	0.458D-02	0.352D+00
LAB 3	0.1307D+01	0.7415D-06	0.861D-03	0.659D-01	0.1562D-05	0.125D-02	0.956D-01	0.5302D-05	0.230D-02	0.176D+00
LAB 4	0.8175D+00	0.5200D-02	0.721D-01	0.882D+01	0.1560D-01	0.125D+00	0.153D+02	0.1848D-04	0.430D-02	0.526D+00
LAB 5	0.1298D+01	0.1068D-03	0.103D-01	0.796D+00	0.3148D-03	0.177D-01	0.137D+01	0.4322D-04	0.657D-02	0.506D+00
LAB 6	0.1301D+01	0.1713D-04	0.414D-02	0.318D+00	-.6156D-04	-.500D+01	-.500D+01	0.9035D-03	0.301D-01	0.231D+01
LAB 7	0.1304D+01	0.7511D-05	0.274D-02	0.210D+00	0.1366D-04	0.370D-02	0.283D+00	0.7095D-04	0.842D-02	0.646D+00
LAB 8	0.9347D+00	0.1073D-02	0.328D-01	0.350D+01	0.3038D-02	0.551D-01	0.590D+01	0.1455D-02	0.381D-01	0.408D+01
LAB 10	0.1321D+01	0.3191D-04	0.565D-02	0.427D+00	0.9397D-04	0.969D-02	0.734D+00	0.1413D-04	0.376D-02	0.284D+00
LAB 12	0.1304D+01	0.5648D-05	0.238D-02	0.182D+00	0.1079D-04	0.328D-02	0.252D+00	0.4925D-04	0.702D-02	0.538D+00
LAB 13	0.1302D+01	0.2119D-07	0.146D-03	0.112D-01	-.1214D-05	-.500D+01	-.500D+01	0.1022D-04	0.320D-02	0.245D+00
LAB 14	0.1309D+01	0.8988D-06	0.948D-03	0.724D-01	0.3075D-06	0.555D-03	0.424D-01	0.1911D-04	0.437D-02	0.334D+00
LAB 15	0.1293D+01	0.9187D-05	0.303D-02	0.234D+00	0.2395D-04	0.489D-02	0.378D+00	0.2893D-04	0.538D-02	0.416D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.1297D+01	0.3007D-05	0.173D-02	0.134D+00	0.2917D-05	0.171D-02	0.132D+00	0.4883D-04	0.699D-02	0.539D+00
LAB 18	0.1304D+01	0.2212D-06	0.470D-03	0.361D-01	0.4559D-06	0.675D-03	0.518D-01	0.1663D-05	0.129D-02	0.989D-01
LAB 19	0.1306D+01	0.1657D-05	0.129D-02	0.986D-01	0.3894D-05	0.197D-02	0.151D+00	0.8608D-05	0.293D-02	0.225D+00
LAB 20	0.1310D+01	0.5330D-06	0.730D-03	0.557D-01	-.1915D-04	-.500D+01	-.500D+01	0.1660D-03	0.129D-01	0.984D+00
LAB 21	0.1277D+01	0.7731D-05	0.278D-02	0.218D+00	0.2097D-04	0.458D-02	0.359D+00	0.1775D-04	0.421D-02	0.330D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 29 SAMPLE BS										
LAB 2	0.1302D+01	0.1807D-04	0.425D-02	0.327D+00	0.5206D-04	0.722D-02	0.554D+00	0.1733D-04	0.416D-02	0.320D+00
LAB 3	0.1295D+01	0.4784D-06	0.692D-03	0.534D-01	0.1274D-05	0.113D-02	0.872D-01	0.1290D-05	0.114D-02	0.877D-01

LAB 4	0.8977D+00	0.6698D-02	0.818D-01	0.912D+01	0.2009D-01	0.142D+00	0.158D+02	0.5336D-04	0.730D-02	0.814D+00
LAB 5	0.1281D+01	0.4871D-04	0.698D-02	0.545D+00	0.1236D-03	0.111D-01	0.868D+00	0.1807D-03	0.134D-01	0.105D+01
LAB 6	0.1166D+01	0.1530D-04	0.391D-02	0.335D+00	-.6790D-04	-.500D+01	-.500D+01	0.9104D-03	0.302D-01	0.259D+01
LAB 7	0.1286D+01	0.7282D-05	0.270D-02	0.210D+00	-.2286D-05	-.500D+01	-.500D+01	0.1931D-03	0.139D-01	0.108D+01
LAB 8	0.1122D+01	0.1368D-02	0.370D-01	0.330D+01	0.3954D-02	0.629D-01	0.561D+01	0.1198D-02	0.346D-01	0.309D+01
LAB 10	0.1300D+01	0.7713D-05	0.278D-02	0.214D+00	0.2246D-04	0.474D-02	0.365D+00	0.5435D-05	0.233D-02	0.179D+00
LAB 12	0.1288D+01	0.3783D-05	0.194D-02	0.151D+00	0.7431D-05	0.273D-02	0.212D+00	0.3135D-04	0.560D-02	0.435D+00
LAB 13	0.1291D+01	0.1289D-06	0.359D-03	0.278D-01	-.3208D-06	-.500D+01	-.500D+01	0.5660D-05	0.238D-02	0.184D+00
LAB 14	0.1291D+01	0.4188D-05	0.205D-02	0.158D+00	0.1126D-04	0.336D-02	0.260D+00	0.1043D-04	0.323D-02	0.250D+00
LAB 15	0.1275D+01	0.3562D-05	0.189D-02	0.148D+00	0.2065D-05	0.144D-02	0.113D+00	0.6898D-04	0.831D-02	0.651D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.1296D+01	0.1016D-04	0.319D-02	0.246D+00	0.2833D-04	0.532D-02	0.411D+00	0.1726D-04	0.415D-02	0.321D+00
LAB 18	0.1287D+01	0.6826D-06	0.826D-03	0.642D-01	-.7447D-06	-.500D+01	-.500D+01	0.2234D-04	0.473D-02	0.367D+00
LAB 19	0.1292D+01	0.8880D-06	0.942D-03	0.729D-01	-.7239D-06	-.500D+01	-.500D+01	0.2710D-04	0.521D-02	0.403D+00
LAB 20	0.1298D+01	0.1903D-03	0.138D-01	0.106D+01	0.5499D-03	0.234D-01	0.181D+01	0.1689D-03	0.130D-01	0.100D+01
LAB 21	0.1206D+01	0.1489D-04	0.386D-02	0.320D+00	0.4331D-04	0.658D-02	0.546D+00	0.1078D-04	0.328D-02	0.272D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RATIO 29 SAMPLE RS										
LAB 2	0.1181D+01	0.2116D-04	0.460D-02	0.390D+00	0.5916D-04	0.769D-02	0.651D+00	0.3466D-04	0.589D-02	0.499D+00
LAB 3	0.1173D+01	0.6391D-06	0.799D-03	0.681D-01	0.1740D-05	0.132D-02	0.112D+00	0.1421D-05	0.119D-02	0.102D+00
LAB 4	0.1115D+01	0.9621D-04	0.981D-02	0.880D+00	0.2863D-03	0.169D-01	0.152D+01	0.1897D-04	0.436D-02	0.391D+00
LAB 5	0.1154D+01	0.5989D-05	0.245D-02	0.212D+00	0.1412D-04	0.376D-02	0.326D+00	0.3076D-04	0.555D-02	0.480D+00
LAB 6	0.1033D+01	0.1353D-03	0.116D-01	0.113D+01	0.2623D-03	0.162D-01	0.157D+01	0.1148D-02	0.339D-01	0.328D+01
LAB 7	0.1166D+01	0.3622D-05	0.190D-02	0.163D+00	-.1445D-04	-.500D+01	-.500D+01	0.2025D-03	0.142D-01	0.122D+01
LAB 8	0.1067D+01	0.1310D-02	0.362D-01	0.339D+01	0.3839D-02	0.620D-01	0.581D+01	0.7274D-03	0.270D-01	0.253D+01
LAB 10	0.1174D+01	0.1090D-04	0.330D-02	0.281D+00	0.3194D-04	0.565D-02	0.481D+00	0.6219D-05	0.249D-02	0.212D+00
LAB 12	0.1168D+01	0.1616D-05	0.127D-02	0.109D+00	0.7693D-06	0.877D-03	0.751D-01	0.3264D-04	0.571D-02	0.489D+00
LAB 13	0.1168D+01	0.2348D-06	0.485D-03	0.415D-01	-.1233D-06	-.500D+01	-.500D+01	0.6623D-05	0.257D-02	0.220D+00
LAB 14	0.1171D+01	0.3960D-05	0.199D-02	0.170D+00	0.1058D-04	0.325D-02	0.278D+00	0.1041D-04	0.323D-02	0.276D+00
LAB 15	0.1160D+01	0.1875D-04	0.433D-02	0.373D+00	0.4792D-04	0.692D-02	0.597D+00	0.6666D-04	0.816D-02	0.704D+00
LAB 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAB 17	0.1172D+01	0.4022D-06	0.634D-03	0.541D-01	0.1485D-06	0.385D-03	0.329D-01	0.8466D-05	0.291D-02	0.248D+00
LAB 18	0.1164D+01	0.5336D-07	0.231D-03	0.198D-01	-.1074D-06	-.500D+01	-.500D+01	0.2140D-05	0.146D-02	0.126D+00
LAB 19	0.1163D+01	0.1174D-05	0.108D-02	0.932D-01	0.2638D-05	0.162D-02	0.140D+00	0.7062D-05	0.266D-02	0.229D+00
LAB 20	0.1160D+01	0.1340D-04	0.366D-02	0.315D+00	-.3235D-05	-.500D+01	-.500D+01	0.3474D-03	0.186D-01	0.161D+01
LAB 21	0.7005D+00	0.4727D-06	0.687D-03	0.981D-01	-.2998D-06	-.500D+01	-.500D+01	0.9961D-05	0.316D-02	0.451D+00
LAB 23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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RESULTS OF SUBROUTINE LAB5
ANALYSIS OF VARIANCES IN THREE STEPS: INTERLAB,RUN AND SCAN COMPONENTS
19 LABS ARE TAKEN INTO ACCOUNT AT MAXIMUM

(IF THE RUN OR SCAN COMPONENT OF ANY VARIANCE IS NEGATIVE AND THEREFORE CONSIDERED AS NOT SIGNIFICANT,
SD AND RSD ARE PUT = 0. CORRESPONDINGLY.)

SAMP	RAT	LABS	RUNS	SCANS	MMEAN	SIG-SCAN	SD-SCAN	RSD-SCAN	SIG-RUN	SD-RUN	RSD-RUN	SIG-LABS	SD-LABS	RSD-LABS
US	83	15	45	360	2.212D-02	2.905D-08	1.705D-04	7.704D-01	9.383D-09	9.686D-05	4.378D-01	4.467D-08	2.114D-04	9.553D-01
PS	92	15	42	336	2.193D-04	3.180D-10	1.783D-05	8.132D+00	8.053D-11	8.974D-06	4.092D+00	1.716D-09	4.142D-05	1.889D+01
PS	2	14	41	328	8.350D-04	6.621D-10	2.573D-05	3.082D+00	4.136D-11	6.431D-06	7.703D-01	6.351D-10	2.520D-05	3.018D+00
AU	38	3	9	72	2.351D-05	7.610D-11	8.724D-06	3.711D+01	1.303D-10	1.141D-05	4.855D+01	1.405D-09	3.749D-05	1.594D+02
AU	48	15	45	359	1.789D-04	1.901D-10	1.379D-05	7.709D+00	2.010D-10	1.418D-05	7.927D+00	6.264D-10	2.503D-05	1.399D+01
AU	58	19	57	456	2.227D-02	4.113D-08	2.028D-04	9.107D-01	9.910D-09	9.955D-05	4.470D-01	3.251D-08	1.803D-04	8.096D-01
AU	68	17	51	407	3.929D-03	3.785D-09	6.152D-05	1.566D+00	2.055D-09	4.533D-05	1.154D+00	1.541D-09	3.925D-05	9.990D-01
AU	89	6	18	144	1.505D-02	5.430D-08	2.330D-04	1.549D+00	8.529D-09	9.235D-05	6.138D-01	3.945D-07	6.281D-04	4.174D+00
AU	9	16	48	384	2.307D-01	2.327D-06	1.526D-03	6.611D-01	2.193D-07	4.683D-04	2.029D-01	2.747D-07	5.241D-04	2.272D-01
AU	19	17	51	408	1.274D-01	1.796D-06	1.340D-03	1.052D+00	5.843D-07	7.644D-04	6.002D-01	8.655D-07	9.303D-04	7.305D-01
AU	29	17	51	408	2.298D-02	1.128D-07	3.359D-04	1.462D+00	7.526D-08	2.743D-04	1.194D+00	1.153D-07	3.395D-04	1.478D+00
BU	38	3	9	72	2.601D-05	3.398D-10	1.843D-05	7.087D+01	1.546D-10	1.243D-05	4.781D+01	1.704D-09	4.128D-05	1.587D+02
BU	48	15	45	356	1.717D-04	1.167D-10	1.080D-05	6.290D+00	6.086D-11	7.801D-06	4.543D+00	2.114D-10	1.454D-05	8.466D+00
BU	58	19	57	456	2.223D-02	4.460D-08	2.112D-04	9.502D-01	2.559D-08	1.600D-04	7.198D-01	2.090D-08	1.446D-04	6.504D-01
BU	68	17	51	404	3.933D-03	2.890D-09	5.376D-05	1.367D+00	2.534D-09	5.034D-05	1.280D+00	3.202D-09	5.659D-05	1.439D+00
BU	89	6	18	144	1.482D-02	4.515D-08	2.125D-04	1.434D+00	6.652D-09	8.156D-05	5.503D-01	1.596D-08	1.263D-04	8.523D-01
BU	9	18	54	432	2.302D-01	2.379D-06	1.542D-03	6.700D-01	8.497D-08	2.915D-04	1.266D-01	7.134D-07	8.446D-04	3.669D-01
BU	19	17	51	408	1.270D-01	1.357D-06	1.165D-03	9.172D-01	3.212D-08	1.792D-04	1.411D-01	2.635D-07	5.133D-04	4.043D-01
BU	29	17	51	408	2.299D-02	7.852D-08	2.802D-04	1.219D+00	2.135D-08	1.461D-04	6.357D-01	9.223D-08	3.037D-04	1.321D+00
RU	38	4	11	88	3.704D-05	2.459D-11	4.958D-06	1.339D+01	6.606D-11	8.128D-06	2.194D+01	1.991D-09	4.463D-05	1.205D+02
RU	48	11	33	264	5.597D-05	3.998D-11	6.323D-06	1.130D+01	3.184D-11	5.643D-06	1.008D+01	8.367D-11	9.147D-06	1.634D+01
RU	58	18	54	432	7.257D-03	4.506D-09	6.713D-05	9.249D-01	2.028D-09	4.503D-05	6.205D-01	3.617D-09	6.014D-05	8.286D-01
RU	68	3	7	56	2.845D-04	2.228D-10	1.493D-05	5.247D+00	-2.583D-11	0.0	0.0	7.688D-07	8.768D-04	3.082D+02
RU	89	5	15	120	7.581D-04	1.247D-08	1.117D-04	1.473D+01	6.377D-08	2.525D-04	3.331D+01	1.974D-06	1.405D-03	1.853D+02
RU	9	14	42	336	2.630D-02	4.734D-08	2.176D-04	8.272D-01	1.469D-08	1.212D-04	4.608D-01	2.683D-08	1.638D-04	6.228D-01
RU	19	12	36	288	7.598D-04	7.918D-10	2.814D-05	3.703D+00	3.119D-10	1.766D-05	2.324D+00	1.255D-09	3.543D-05	4.663D+00
RU	29	10	30	240	3.832D-05	2.665D-11	5.162D-06	1.347D+01	1.266D-10	1.125D-05	2.937D+01	7.578D-11	8.705D-06	2.272D+01
AS	38	18	54	432	6.399D-01	2.529D-05	5.029D-03	7.860D-01	9.913D-06	3.148D-03	4.921D-01	2.480D-05	4.980D-03	7.783D-01
AS	48	13	39	312	2.892D-04	5.120D-10	2.263D-05	7.823D+00	2.267D-09	4.762D-05	1.646D+01	6.659D-10	2.581D-05	8.922D+00
AS	58	17	51	408	2.221D-02	6.226D-08	2.495D-04	1.124D+00	1.621D-08	1.273D-04	5.733D-01	4.024D-08	2.006D-04	9.032D-01
AS	68	16	48	384	3.882D-03	6.928D-09	8.324D-05	2.144D+00	4.107D-08	2.027D-04	5.221D+00	-1.264D-08	0.0	0.0
AS	89	5	15	120	1.482D-02	1.755D-07	4.190D-04	2.827D+00	7.549D-08	2.747D-04	1.854D+00	1.451D-07	3.809D-04	2.569D+00
AS	9	17	51	408	2.341D-01	5.426D-06	2.329D-03	9.951D-01	1.087D-06	1.043D-03	4.455D-01	1.911D-06	1.382D-03	5.905D-01
AS	19	16	48	384	1.266D-01	3.858D-06	1.964D-03	1.552D+00	3.115D-06	1.765D-03	1.395D+00	6.743D-07	8.211D-04	6.488D-01
AS	29	15	45	360	1.302D+00	9.390D-05	9.690D-03	7.440D-01	2.861D-05	5.349D-03	4.106D-01	7.786D-05	8.824D-03	6.775D-01
BS	38	18	54	432	6.326D-01	4.007D-05	6.330D-03	1.001D+00	3.061D-06	1.750D-03	2.766D-01	2.652D-05	5.149D-03	8.140D-01
BS	48	13	37	296	3.020D-04	2.979D-10	1.726D-05	5.716D+00	9.216D-10	3.036D-05	1.005D+01	1.041D-09	3.227D-05	1.068D+01
BS	58	17	51	408	2.221D-02	6.743D-08	2.597D-04	1.169D+00	3.140D-08	1.772D-04	7.979D-01	2.214D-08	1.488D-04	6.700D-01
BS	68	14	42	336	3.882D-03	3.475D-09	5.895D-05	1.518D+00	1.205D-09	3.471D-05	8.941D-01	1.768D-09	4.205D-05	1.083D+00
BS	89	5	15	120	1.545D-02	1.756D-07	4.190D-04	2.711D+00	3.957D-07	6.291D-04	4.070D+00	1.622D-06	1.274D-03	8.241D+00
BS	9	17	51	408	2.344D-01	7.005D-06	2.647D-03	1.129D+00	3.053D-06	1.747D-03	7.454D-01	2.555D-07	5.055D-04	2.157D-01
BS	19	16	48	384	1.264D-01	2.612D-06	1.616D-03	1.279D+00	2.402D-06	1.550D-03	1.226D+00	-2.876D-07	0.0	0.0
BS	29	13	39	312	1.291D+00	5.768D-05	7.595D-03	5.883D-01	6.110D-05	7.816D-03	6.055D-01	3.399D-05	5.830D-03	4.517D-01
RS	38	18	54	432	7.534D-01	2.621D-05	5.120D-03	6.795D-01	1.402D-06	1.184D-03	1.572D-01	2.896D-05	5.382D-03	7.143D-01
RS	48	12	36	288	2.083D-04	3.197D-10	1.788D-05	8.583D+00	1.764D-09	4.200D-05	2.016D+01	-3.679D-10	0.0	0.0
RS	58	16	48	384	7.507D-03	1.176D-08	1.084D-04	1.444D+00	6.349D-09	7.968D-05	1.061D+00	7.177D-09	8.472D-05	1.129D+00
RS	68	4	11	88	4.242D-05	2.248D-11	4.741D-06	1.118D+01	8.886D-10	2.981D-05	7.027D+01	6.393D-10	2.528D-05	5.960D+01
RS	89	5	15	120	1.428D-02	4.655D-05	6.822D-03	4.778D+01	1.352D-03	3.677D-02	2.575D+02	5.005D-04	2.237D-02	1.567D+02
RS	9	15	45	360	3.298D-02	7.833D-08	2.799D-04	8.485D-01	6.601D-08	2.569D-04	7.790D-01	6.172D-08	2.484D-04	7.532D-01
RS	19	12	36	288	2.026D-03	4.263D-09	6.529D-05	3.222D+00	4.108D-09	6.409D-05	3.163D+00	1.482D-09	3.850D-05	1.900D+00
RS	29	13	39	312	1.167D+00	5.823D-05	7.631D-03	6.537D-01	1.162D-05	3.409D-03	2.921D-01	4.546D-05	6.742D-03	5.776D-01

RESULTS OF THE SUBROUTINE LAB6 - TWOFOLD ANALYSIS OF VARIANCES

83	US	0.2246D-01	0.4809D-07	0.2193D-03	0.9763D+00	0.8483D-06	0.9211D-03	0.4101D+01	0.5160D-07	0.2271D-03	0.1011D+01
38	AU	0.2351D-04	0.4839D-09	0.2200D-04	0.9357D+02	0.1405D-08	0.3749D-04	0.1594D+03	0.1398D-09	0.1182D-04	0.5029D+02
38	BU	0.2601D-04	0.5899D-09	0.2429D-04	0.9337D+02	0.1704D-08	0.4128D-04	0.1587D+03	0.1971D-09	0.1404D-04	0.5397D+02
38	RU	0.3400D-04	0.4923D-09	0.2219D-04	0.6525D+02	0.1949D-08	0.4415D-04	0.1298D+03	0.6049D-10	0.7778D-05	0.2287D+02
38	AS	0.6399D+00	0.1620D-05	0.1273D-02	0.1989D+00	0.2480D-04	0.4980D-02	0.7783D+00	0.1307D-04	0.3616D-02	0.5651D+00
38	BS	0.6326D+00	0.1623D-05	0.1274D-02	0.2014D+00	0.2652D-04	0.5149D-02	0.8140D+00	0.8069D-05	0.2841D-02	0.4490D+00
38	RS	0.7534D+00	0.1696D-05	0.1302D-02	0.1728D+00	0.2896D-04	0.5382D-02	0.7143D+00	0.4678D-05	0.2163D-02	0.2871D+00
48	AU	0.1788D-03	0.4663D-10	0.6829D-05	0.3819D+01	0.6245D-09	0.2499D-04	0.1397D+02	0.2249D-09	0.1500D-04	0.8387D+01
48	BU	0.1712D-03	0.1704D-10	0.4128D-05	0.2411D+01	0.2291D-09	0.1514D-04	0.8839D+01	0.7964D-10	0.8924D-05	0.5211D+01
48	RU	0.5932D-04	0.1753D-10	0.4187D-05	0.7058D+01	0.2175D-09	0.1475D-04	0.2486D+02	0.3117D-10	0.5583D-05	0.9412D+01
48	AS	0.2892D-03	0.1110D-09	0.1054D-04	0.3643D+01	0.6659D-09	0.2581D-04	0.8922D+01	0.2331D-08	0.4828D-04	0.1669D+02
48	BS	0.3086D-03	0.1506D-09	0.1227D-04	0.3977D+01	0.1252D-08	0.3538D-04	0.1147D+02	0.2119D-08	0.4603D-04	0.1492D+02
48	RS	0.2001D-03	0.8431D-10	0.9182D-05	0.4589D+01	0.5220D-09	0.2285D-04	0.1142D+02	0.1722D-08	0.4150D-04	0.2074D+02
58	AU	0.2227D-01	0.1975D-08	0.4444D-04	0.1996D+00	0.3251D-07	0.1803D-03	0.8096D+00	0.1505D-07	0.1227D-03	0.5509D+00
58	BU	0.2223D-01	0.1647D-08	0.4058D-04	0.1826D+00	0.2090D-07	0.1446D-03	0.6504D+00	0.3117D-07	0.1765D-03	0.7943D+00
58	RU	0.7257D-02	0.2489D-09	0.1578D-04	0.2174D+00	0.3617D-08	0.6014D-04	0.8286D+00	0.2591D-08	0.5090D-04	0.7014D+00
58	AS	0.2221D-01	0.2837D-08	0.5327D-04	0.2399D+00	0.4024D-07	0.2006D-03	0.9032D+00	0.2399D-07	0.1549D-03	0.6975D+00
58	BS	0.2221D-01	0.2083D-08	0.4564D-04	0.2055D+00	0.2214D-07	0.1488D-03	0.6700D+00	0.3983D-07	0.1996D-03	0.8987D+00
58	RS	0.1203D-01	0.2045D-04	0.4523D-02	0.3760D+02	0.3474D-03	0.1864D-01	0.1550D+03	0.8209D-06	0.9060D-03	0.7532D+01
68	AU	0.4003D-02	0.5649D-08	0.7516D-04	0.1877D+01	0.7589D-07	0.2755D-03	0.6882D+01	0.7735D-07	0.2781D-03	0.6948D+01
68	BU	0.3930D-02	0.2315D-09	0.1521D-04	0.3872D+00	0.9340D-09	0.3056D-04	0.7777D+00	0.9698D-08	0.9848D-04	0.2506D+01
68	RU	0.4435D-05	0.9883D-11	0.3144D-05	0.7088D+02	0.1909D-10	0.4369D-05	0.9851D+02	0.2025D-11	0.1423D-05	0.3209D+02
68	AS	0.3863D-02	0.4127D-09	0.2032D-04	0.5259D+00	-.6399D-08	-.5000D+01	-.5000D+01	0.4024D-07	0.2006D-03	0.5193D+01
68	BS	0.3828D-02	0.9848D-09	0.3138D-04	0.8197D+00	0.3622D-08	0.6018D-04	0.1572D+01	0.3936D-07	0.1984D-03	0.5182D+01
68	RS	0.4495D-04	0.2430D-09	0.1559D-04	0.3468D+02	0.4636D-09	0.2153D-04	0.4790D+02	0.1525D-08	0.3906D-04	0.8689D+02

92	PS	0.1277D-01	0.3929D-06	0.6268D-03	0.4907D+01	0.6677D-05	0.2584D-02	0.2023D+02	0.3640D-08	0.6034D-04	0.4724D+00
2	PS	0.9022D-03	0.2185D-08	0.4674D-04	0.5181D+01	0.3708D-07	0.1926D-03	0.2135D+02	0.1865D-09	0.1365D-04	0.1514D+01
89	AU	0.1793D-01	0.8336D-05	0.2887D-02	0.1611D+02	0.3599D-04	0.5999D-02	0.3347D+02	0.6707D-04	0.8190D-02	0.4569D+02
89	BU	0.1660D-01	0.3169D-05	0.1780D-02	0.1072D+02	0.2193D-04	0.4682D-02	0.2820D+02	0.7775D-06	0.8817D-03	0.5311D+01
89	RU	0.7581D-03	0.3992D-06	0.6318D-03	0.8334D+02	0.1974D-05	0.1405D-02	0.1853D+03	0.6533D-07	0.2556D-03	0.3372D+02
89	AS	0.2194D-01	0.5071D-04	0.7121D-02	0.3245D+02	0.3014D-03	0.1736D-01	0.7912D+02	0.8616D-05	0.2935D-02	0.1338D+02
89	BS	0.2963D-01	0.2012D-03	0.1419D-01	0.4787D+02	0.6704D-03	0.2589D-01	0.8738D+02	0.1611D-02	0.4014D-01	0.1354D+03
89	RS	0.1428D-01	0.1906D-03	0.1381D-01	0.9669D+02	0.5005D-03	0.2237D-01	0.1567D+03	0.1358D-02	0.3684D-01	0.2581D+03
9	AU	0.2307D+00	0.2211D-07	0.1487D-03	0.6445D-01	-.1297D-06	-.5000D+01	-.5000D+01	0.1583D-05	0.1258D-02	0.5453D+00
9	BU	0.2302D+00	0.4671D-07	0.2161D-03	0.9389D-01	0.7134D-06	0.8446D-03	0.3669D+00	0.3823D-06	0.6183D-03	0.2686D+00
9	RU	0.2637D-01	0.4720D-07	0.2173D-03	0.8239D+00	0.8094D-06	0.8996D-03	0.3412D+01	0.1209D-06	0.3477D-03	0.1319D+01
9	AS	0.2341D+00	0.1470D-06	0.3834D-03	0.1638D+00	0.1911D-05	0.1382D-02	0.5905D+00	0.1766D-05	0.1329D-02	0.5677D+00
9	BS	0.2344D+00	0.9205D-07	0.3034D-03	0.1294D+00	0.2555D-06	0.5055D-03	0.2157D+00	0.3928D-05	0.1982D-02	0.8456D+00
9	RS	0.3513D-01	0.3905D-05	0.1976D-02	0.5625D+01	0.6622D-04	0.8138D-02	0.2316D+02	0.5181D-06	0.7198D-03	0.2049D+01
19	AU	0.1277D+00	0.1507D-06	0.3882D-03	0.3041D+00	0.2457D-05	0.1568D-02	0.1228D+01	0.7679D-06	0.8763D-03	0.6864D+00
19	BU	0.1272D+00	0.6096D-07	0.2469D-03	0.1941D+00	0.9762D-06	0.9880D-03	0.7768D+00	0.3633D-06	0.6028D-03	0.4739D+00
19	RU	0.8132D-03	0.1487D-08	0.3856D-04	0.4741D+01	0.2352D-07	0.1534D-03	0.1886D+02	0.8032D-09	0.2834D-04	0.3485D+01
19	AS	0.1268D+00	0.1425D-06	0.3775D-03	0.2978D+00	0.1209D-05	0.1100D-02	0.8676D+00	0.3641D-05	0.1908D-02	0.1505D+01
19	BS	0.1269D+00	0.2552D-06	0.5052D-03	0.3982D+00	0.3463D-05	0.1861D-02	0.1467D+01	0.2626D-05	0.1621D-02	0.1277D+01
19	RS	0.2501D-02	0.1979D-06	0.4449D-03	0.1779D+02	0.3164D-05	0.1779D-02	0.7113D+02	0.7944D-08	0.8913D-04	0.3564D+01
29	AU	0.2325D-01	0.8041D-07	0.2836D-03	0.1220D+01	0.1297D-05	0.1139D-02	0.4899D+01	0.4516D-06	0.6720D-03	0.2891D+01
29	BU	0.2289D-01	0.1405D-07	0.1185D-03	0.5177D+00	0.2184D-06	0.4674D-03	0.2042D+01	0.1033D-06	0.3213D-03	0.1404D+01
29	RU	0.6526D-04	0.4897D-09	0.2213D-04	0.3391D+02	0.5556D-08	0.7454D-04	0.1142D+03	0.9615D-09	0.3101D-04	0.4751D+02
29	AS	0.1252D+01	0.1209D-02	0.3478D-01	0.2777D+01	0.2018D-01	0.1420D+00	0.1134D+02	0.1143D-02	0.3380D-01	0.2699D+01
29	BS	0.1245D+01	0.6309D-03	0.2512D-01	0.2017D+01	0.1023D-01	0.1012D+00	0.8122D+01	0.1481D-02	0.3848D-01	0.3090D+01
29	RS	0.1123D+01	0.7938D-03	0.2818D-01	0.2509D+01	0.1340D-01	0.1158D+00	0.1031D+02	0.2865D-03	0.1693D-01	0.1507D+01

13. IDA 72-Measurements in One Additional Laboratory

by

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Due to laboratory difficulties the IDA 72-measurements could not be executed in the foreseen time interval in the laboratory with code no. 22. So the data have been communicated to the evaluation group at a time when the results of the other participants had already been published.

Nevertheless this laboratory has participated fully in the standard experiment. Therefore, in order to allow a comparison of the results of this laboratory with those of the majority, they have been included in the figures and tables, as they are given in the general report on the experiment. In this extra note, short comments are added.

The paper should be considered as an appendix to the general report. Comments are given only for those figures and tables in which the results of laboratory 22 show special features. In all figures the mean value has been calculated without the value from laboratory 22.

In Fig. 13-1 the values for the ratio U-235/U-238 of the unspiked A and B samples lie about 8 % below the mean value. Also, the values for the ratio U-236/U-238 in Fig. 13-2 lie below the mean value, this time about 10 %. The same is true for the results of the R sample where again the ratio U-235/U-238 /Fig. 13-3/ lies about 10 % below the line of the mean value. All these effects make a contamination by depleted uranium during the chemical preparation rather probable. Another possibility is a contamination of the filaments by natural uranium. It was stated, however, at the meeting of IDA participants that this is rather unlikely /Vol. I, Chapter 8/.

It is strange in this context that the concentration value for U-238 /Fig. 13-4/ lies somewhat high for the A and B samples in agreement with the arguments given before - but the value for the R sample lies too low. This may be due to the fact that for the spiked R samples the measured ratios of e.g. U-233/U-238 were measured higher than in the group of the other laboratories /Fig. 13-5/. The effect could not be explained.

In the case of plutonium the results on the ratio Pu-240/Pu-239 of the unspiked A and B samples /Fig. 13-6/ are outliers with values lying more than 2 % below the mean values. For the ratios Pu-241/Pu-239 of the same samples /Fig. 13-7/ the 1σ-ranges of the measurements were abnormally large. The same is true for the measurements of the ratio Pu-242/Pu-239 /Fig. 13-8/. The values for the unspiked R sample given in Fig. 13-9 agree well with the group of the other laboratories.

The laboratory 22 has decided to measure the ratio Pu-238/Pu-239 by α-spectrometry. Only for the unspiked R sample the result is in agreement with the mean value /Fig. 13-10/, the values for the unspiked and spiked A and B samples and for the spiked R sample deviate by about - 9 %, - 30 % and + 70 % /Fig. 13-11, 13-12, 13-13/. Specially for the spiked R sample also other laboratories found highly deviating results - the differences found are as large as 333 %!

The resulting figures on the Pu-239-concentration calculated for laboratory 22 lie well within the band of values around the mean values calculated for the group, see Fig. 13-14.

Comparison of the results of the analysis of variances as they are calculated for 19 laboratories (normal group) or 20 laboratories (with inclusion of the results of laboratory 22) show no striking features.

In most cases the mean values and the estimates of the relative standard deviations remain practically unchanged. In a few cases where addition of this one laboratory changes the mean value considerably (~1%) the estimate for the interlaboratory component of the relative standard deviation becomes larger as one would also expect for these cases. In a few cases the estimates for the scan component of the relative standard deviation becomes a bit smaller which is also understandable since the number of scans is enlarged by 24 when one laboratory is added.

How the numerical results of laboratory 22 for isotopic ratios compare with those of the group can be seen in Tables 13-1, 13-2 and 13-3 for the uranium isotopes of the unspiked A, B and R samples and in Tables 13-4, 13-5 and 13-6 for the plutonium isotopes of the unspiked A, B and R samples.

The results of α-spectrometry are combined in Tables 13-7, 13-8 and 13-9.
Table 13-10 gives a survey over the concentration of the main isotopes U-238 and Pu-239 as well as the Pu/U ratios for all the laboratories.

As can be seen in the corresponding figures /Fig. 13-4 and 13-5 for uranium, Fig. 13-16 and 13-17 for plutonium/ the results of laboratory 22 lie well inside the band of values obtained by the group.

Table 13-1: IDA-72: Calculated Laboratory Mean Values of the Isotopic Composition of Sample A(unspiked)

Relative Isotopic Abundances [atom %]

Lab. Code	U-233	U-234	U-235	U-236	U-238
2	0.00008	0.0162	2.162	0.3818	97.440
3	-	0.0173	2.178	0.3919	97.413
4	-	-	(2.177)	(0.5125)	(97.311)
5	-	0.0247	2.195	0.3912	97.390
6	-	0.0167	2.179	0.3849	97.419
7	-	0.0135	2.145	0.3797	97.462
8	0.00657	0.0188	2.204	0.3766	97.394
10	0.00022	0.0162	2.155	0.3829	97.446
12	-	-	2.169	0.3866	97.444
13	-	0.0180	2.165	0.3805	97.436
14	-	0.0195	2.156	0.3833	97.441
15	-	0.0166	2.181	0.3861	97.416
16	-	0.0178	2.174	0.3817	97.427
17	-	0.0154	2.152	0.3808	97.452
18	-	0.0189	2.173	0.3746	97.433
19	-	0.0171	2.148	0.3820	97.453
20	-	0.0148	2.141	0.3770	97.468
21	-	-	2.165	0.3862	97.449
22	-	(0.0149)	(2.007)	(0.3479)	(97.631)
23	-	-	(2.212)	-	(97.788)
Mean of means:		0.0174	2.167	0.3828	97.434
SD		0.0026	0.017	0.0047	0.022
RSD [%]		14.7	0.79	1.23	0.02

Values in brackets were not used for the calculation of the mean values.

Table 13-2: IDA-72: Calculated Laboratory Mean Values of the Isotopic Composition of Sample B(unspiked)

Relative Isopic Abundances [atom %]

Lab. Code	U-233	U-234	U-235	U-236	U-238
2	0.00012	0.0165	2.155	0.3821	97.446
3	-	0.0170	2.140	0.3854	97.458
4	-	-	2.177	0.4011	97.422
5	-	0.0194	2.174	0.3816	97.425
6	-	0.0160	2.180	0.3850	97.419
7	-	0.0149	2.152	0.3801	97.453
8	0.00727	0.0180	2.181	0.3730	97.421
10	0.00022	0.0161	2.148	0.3796	97.456
12	-	-	2.171	0.3858	97.443
13	-	0.0194	2.163	0.3798	97.438
14	-	0.0159	2.160	0.3861	97.439
15	-	0.0174	2.175	0.3858	97.422
16	-	0.0162	2.185	0.3873	97.412
17	-	0.0158	2.157	0.3831	97.444
18	-	0.0175	2.186	0.3803	97.416
19	-	0.0167	2.146	0.3807	97.457
20	-	0.0135	2.135	0.3712	97.481
21	-	-	2.170	0.3841	97.446
22	-	(0.0147)	(1.988)	(0.3376)	(97.660)
23	-	-	(2.203)	-	(97.797)
Mean of means:		0.0167	2.164	0.3829	97.439
SD		0.0015	0.016	0.0063	0.019
RSD [%]		9.26	0.73	1.64	0.02

Values in brackets were not used for the calculation of the mean values.

Table 13-3: IDA-72: Calculated Laboratory Mean Values of the Isotopic Composition of Sample R(unspiked)

Relative Isotopic Abundances [atom %]

Lab. Code	U-233	U-234	U-235	U-236	U-238
2	0.00005	0.0059	0.7214	0.00075	99.272
3	0.00374	0.0066	0.7204	-	99.269
4	-	-	0.7207	-	99.279
5	-	0.0099	0.7326	-	99.257
6	-	0.0066	0.7274	-	99.266
7	-	0.0035	0.7099	-	99.287
8	0.00947	0.0056	0.7263	-	99.259
10	0.00023	0.0052	0.7165	0.00013	99.278
12	-	0.0055	0.7179	-	99.277
13	-	-	0.7211	-	99.279
14	-	0.0050	0.7215	-	99.273
15	-	0.0068	0.7306	-	99.263
16	-	-	0.7208	-	99.279
17	-	0.0051	0.7184	-	99.276
18	-	0.0039	0.7267	-	99.269
19	-	0.0059	0.7135	-	99.281
20	-	0.0048	0.7086	-	99.287
21	-	-	(2.824)	(0.1906)	(96.985)
22	-	(0.0049)	(0.6506)	-	(99.344)
23	-	-	0.7144	-	99.286
Mean of means :		0.0057	0.7205	-	99.274
SD		0.0015	0.0066		0.009
RSD [%]		26.7	0.91	-	0.01
CBNM		0.0055	0.7203		99.2742

Values in brackets were not used for the calculation of the mean values.

Table 13-4: IDA-72 : Calculated Laboratory Mean Values of the Isotopic Composition of Sample A (unspiked)

Relative Isotopic Abundances [atom %]

Lab. Code	Method used for Pu-238 determination	Pu-238	Pu-239	Pu-240	Pu-241	Pu-242	Reason for rejection
2	none	-	(72.106)	(16.628)	(9.576)	(1.691)	no Pu-238 measurement
3	α	1.048	71.491	16.571	9.235	1.655	
4	α	1.028	71.634	16.510	9.200	1.627	
5	α	1.045	71.795	16.551	8.983	1.627	
6	α	1.057	71.605	16.538	9.147	1.653	
7	α	1.042	71.661	16.535	9.110	1.652	
8	MS	(1.085)	(71.330)	(16.385)	(9.215)	(1.985)	Pu-242/Pu-239 outlier
10	MS	1.046	71.709	16.479	9.125	1.640	
12	none	-	(72.402	(16.697)	(9.244)	(1.657)	no Pu-238 measurement
13	α	1.054	71.704	16.526	9.095	1.621	
14	MS	1.074	71.728	16.507	9.055	1.636	
15	α	1.053	71.620	16.539	9.137	1.651	
16	MS	1.159	71.452	16.582	9.162	1.646	
17	α	1.053	71.661	16.536	9.113	1.637	
18	α	1.048	71.648	16.514	9.144	1.646	
19	α	1.058	71.748	16.515	9.062	1.618	
20	none	-	(72.373)	(16.769)	(9.216)	(1.642)	no Pu-238 measurement
21	α	(0.655)	(71.930)	(16.605)	(9.072)	(1.738)	Pu-238/Pu-239 outlier
22	α	(0.947)	(71.947)	(16.232)	(9.113)	(1.760)	
Mean of means		1.059	71.650	16.531	9.121	1.639	
SD		0.032	0.096	0.027	0.065	0.013	
RSD [%]		3.01	0.13	0.17	0.71	0.77	

Values in brackets were not used for the calculation of mean value, SD and RSD

Table 13-5: IDA-72 : Calculated Laboratory Mean Values of the Isotopic Composition of Sample B(unspiked)

Lab. Code	Method used for Pu-238 determination	Pu-238	Pu-239	Pu-240	Pu-241	Pu-242	Reason for rejection
		Relative Isotopic Abundances [atom %]					
2	none	-	(72.219)	(16.655)	(9.443)	(1.683)	no Pu-238 measurement
3	α	1.047	71.621	16.514	9.148	1.669	
4	α	1.035	71.763	16.457	9.131	1.613	
5	α	(0.862)	(71.840)	(16.579)	(9.094)	(1.625)	Pu-238/Pu-239 outlier
6	α	1.047	71.619	16.544	9.140	1.651	
7	α	1.043	71.704	16.487	9.126	1.641	
8	MS	1.073	71.842	16.341	9.039	1.705	
10	MS	1.047	71.762	16.452	9.098	1.641	
12	none	-	(72.400)	(16.696)	(9.236)	(1.667)	no Pu-238 measurement
13	α	1.045	71.724	16.496	9.101	1.634	
14	MS	1.070	71.620	16.540	9.122	1.648	
15	α	1.060	71.660	16.517	9.116	1.647	
16	MS	1.054	71.611	16.584	9.115	1.637	
17	α	1.049	71.641	16.525	9.145	1.640	
18	α	1.021	71.714	16.513	9.104	1.648	
19	α	1.055	71.762	16.495	9.070	1.618	
20	none	-	(72.623)	(16.666)	(9.163)	(1.548)	no Pu-238 measurement
21	α	(0.716)	(71.929)	(16.589)	(9.081)	(1.685)	Pu-238/Pu-239 outlier
22	α	(0.975)	(72.166)	(16.218)	(9.022)	(1.619)	
Mean of means		1.050	71.696	16.497	9.112	1.646	
SD		0.014	0.073	0.059	0.031	0.023	
RSD [%]		1.30	0.10	0.36	0.34	1.38	

Values in brackets were not used for the calculation of mean value, SD and RSD

Table 13-6: IDA-72 : Calculated Laboratory Mean Values of the Isotopic Composition of Sample R(unspiked)

Relative Isotopic Abundances [atom %]

Lab. Code	Method used for Pu-238 determination	Pu-238	Pu-239	Pu-240	Pu-241	Pu-242	Reason for rejection
2	none	-	97.345	2.569	0.0803	0.00536	
3	α	0.00387	97.338	2.584	0.0712	0.00303	
4	α	(0.00383)	(97.708)	(2.288)	-	-	no Pu-241measurement, Pu-240/Pu-239 outlier
5	α	0.00358	97.222	2.692	0.0820	-	
6	α	0.00663	97.326	2.581	0.0770	0.00973	
7	α	0.00371	97.394	2.522	0.0778	0.00235	
8	MS	(0.02916)	(97.188)	(2.657)	(0.0964)	(0.02916)	Pu-241/Pu-239 outlier
10	MS	0.00697	97.340	2.577	0.0724	0.00314	
12	none	-	97.363	2.565	0.0724	-	
13	α	0.00755	97.376	2.547	0.0695	-	
14	MS	0.00933	97.334	2.580	0.0739	0.00284	
15	α	0.00389	97.351	2.564	0.0761	0.00482	
16	none	-	97.375	2.550	0.0718	0.00336	
17	α	0.00378	97.367	2.556	0.0705	0.00296	
18	α	0.00362	97.366	2.554	0.0725	0.00449	
19	none	-	97.361	2.561	0.0728	0.00494	
20	none	-	97.392	2.541	0.0662	-	
21	α	(0.02597)	(97.128)	(2.717)	(0.1295)	-	Pu-238/Pu-239 and Pu-241/Pu-239outlier
22	α	(0.0042)	(97.347)	(2.570)	(0.0737)	(0.00592)	
Mean of means		0.00529	97.350	2.570	0.0738	0.00427	
	SD	0.00212	0.041	0.038	0.0042	0.00207	
	RSD	40.1	0.04	1.47	5.68	48.4	
CBNM		0.0039	97.355	2.565	0.0724	0.0032	

Values in brackets were not used for the calculation of mean value, SD and RSD

Table 13-7: IDA-72 : α - Spectrometric Determination of Pu-238 on Unspiked Samples A and B

Laboratory Code	Sample A, unspiked			Sample B, unspiked		
	Lab.mean of α-activity ratio $\frac{Pu\text{-}238}{(Pu\text{-}239+Pu\text{-}240)}$	RSD of single determination [%]	Calculated isotopic ratio $\frac{Pu\text{-}238}{Pu\text{-}239}$	Lab.mean of α-activity ratio $\frac{Pu\text{-}238}{(Pu\text{-}239+Pu\text{-}240)}$	RSD of single determination [%]	Calculated isotopic ratio $\frac{Pu\text{-}238}{Pu\text{-}239}$
3	2.194	1.01	0.01466	2.193	1.39	0.01462
4	2.153	2.18	0.01435	2.169	1.31	0.01443
5	2.182	0.74	0.01455	(1.798)	0.54	(0.01199)
6	2.213	1.55	0.01477	2.192	1.07	0.01462
7	2.180	1.47	0.01454	2.184	0.05	0.01454
13	2.206	0.73	0.01470	2.188	0.43	0.01457
15	2.203	0.17	0.01470	2.218	2.26	0.01478
17	2.204	0.52	0.01470	2.196	0.23	0.01465
18	2.193	0.70	0.01462	2.137	0.71	0.01424
19	2.213	0.29	0.01474	2.208	0.39	0.01470
21	(1.366)	-	(0.00911)	(1.494)	-	(0.00996)
22	(1.995)	2.74	(0.01317)	(2.051)	2.51	(0.01352)
Mean of lab. means	2.194	-	0.01463	2.187	-	0.01457

Values in brackets are considered as outliers and not used for calculating the mean of lab. means.

Table 13-8: IDA-72 : α -Spectrometric Determination of Pu-238 on Spiked Samples A and B

Laboratory Code	Sample A, spiked			Sample B, spiked		
	Lab. mean of α-activity ratio $\frac{\text{Pu-238}}{\text{(Pu-239+Pu-240)}}$	RSD of single determination [%]	Calculated isotopic ratio $\frac{\text{Pu-238}}{\text{Pu-239}}$	Lab. mean of α-activity ratio $\frac{\text{Pu-238}}{\text{(Pu-239+Pu-240)}}$	RSD of single determination [%]	Calculated isotopic ratio $\frac{\text{Pu-238}}{\text{Pu-239}}$
3	2.134	1.46	0.01436	2.146	1.00	0.01448
4	2.113	1.56	0.01404	2.085	1.96	0.01402
5	2.059	0.43	0.01382	2.134	1.06	0.01431
6	2.162	0.55	0.01455	2.156	0.50	0.01446
7	2.162	0.35	0.01455	2.158	0.03	0.01445
13	2.163	1.08	0.01451	2.126	0.17	0.01427
15	2.164	2.98	0.01452	2.172	3.48	0.01454
17	2.175	0.23	0.01463	2.177	0.12	0.01463
18	2.153	1.42	0.01446	2.140	0.47	0.01435
19	2.167	0.61	0.01458	2.160	0.13	0.01453
21	(1.045)	-	(0.00702)	(0.884)	-	(0.00594)
22	(1.670)	1.52	(0.01114)	(1.496)	9.85	(0.00998)
Mean of lab. means	2.145	-	0.01440	2.145	-	0.01440

Values in brackets are considered as outliers and not used for calculating the mean of lab. means.

Table 13-9: IDA-72 : α -Spectrometric Determination of Pu-238 on R-Samples

Laboratory Code	Sample R, unspiked			Sample R, spiked		
	Lab. mean of α-activity ratio $\frac{Pu\text{-}238}{(Pu\text{-}239+Pu\text{-}240)}$	RSD of single determination [%]	Calculated isotopic ratio $\frac{Pu\text{-}238}{Pu\text{-}239}$	Lab. mean of α -activity ratio $\frac{Pu\text{-}238}{(Pu\text{-}239+Pu\text{-}240)}$	RSD of single determination [%]	Calculated isotopic ratio $\frac{Pu\text{-}238}{Pu\text{-}239}$
3	0.0101	4.89	0.00004	0.0235	2.80	0.00010
4	0.0100	6.26	0.00004	0.0197	4.33	0.00008
5	0.0093	4.69	0.00004	(0.0717)	0.58	(0.00029)
6	0.0173 [1)]	6.97	0.00007	0.0218	7.99	0.00009
7	0.0097	1.58	0.00004	0.0229	6.62	0.00009
13	0.0197	1.40	0.00008	(0.0461)	1.95	(0.00019)
15	0.0101	3.42	0.00004	-	-	-
17	0.0098	0.59	0.00004	0.0294	1.10	0.00012
18	0.0094	3.35	0.00004	0.0286	2.62	0.00012
19	-	-	-	-	-	-
21	(0.0674)	-	(0.00027)	(0.1053)	-	(0.00047)
22	0.0109	6.99	0.00004	(0.0415)	7.8	(0.00017)
Mean of lab. means	0.0117	-	0.00005	0.0243	-	0.00010

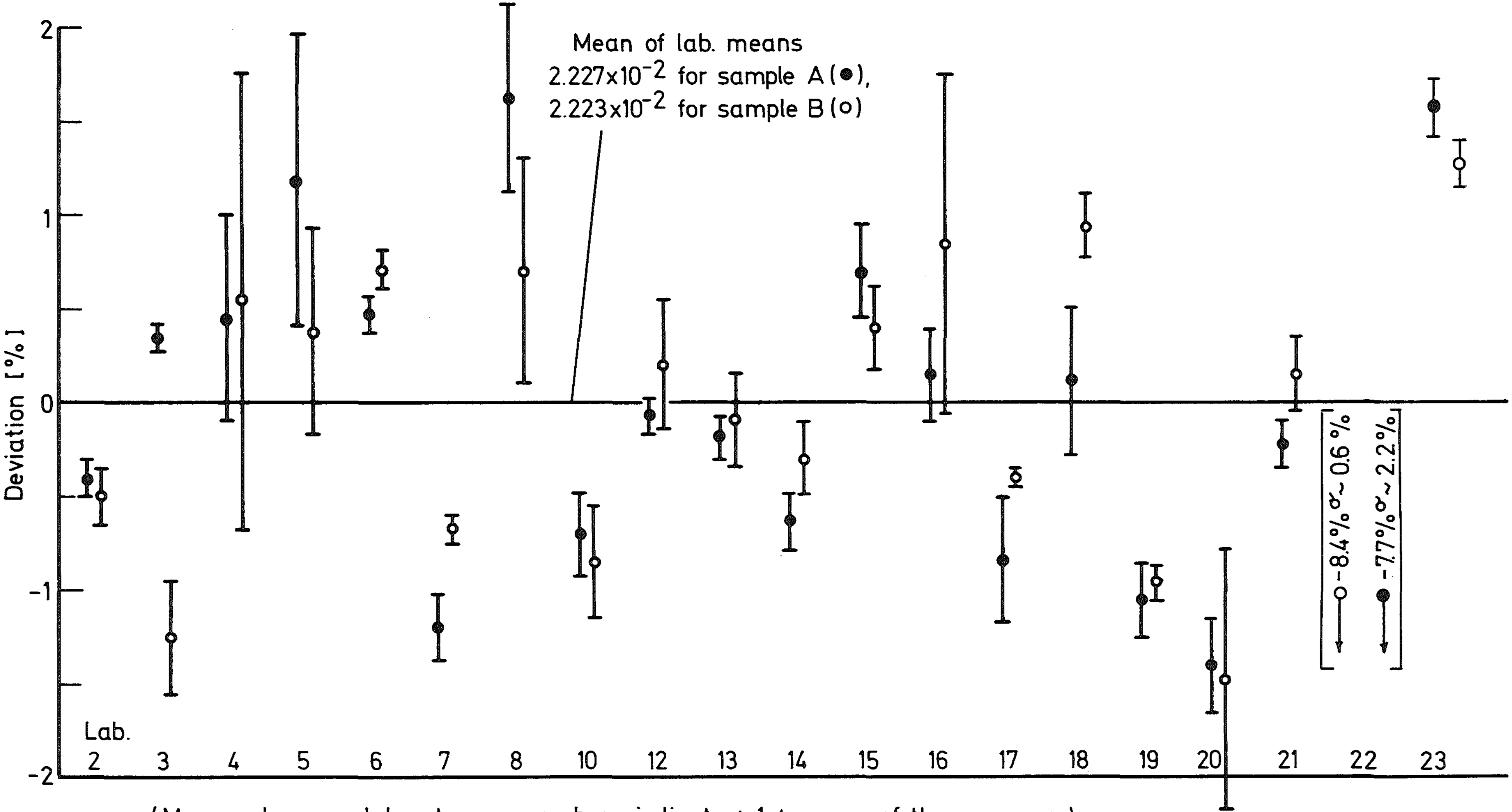
Values in brackets are considered as outliers and not used for calculating the mean of lab. means.

1) Mean value of 2 single determinations only. The third determination was marked as outlier by the laboratory.

Table 13-10: IDA 72: U-238 and Pu-239 Concentrations and Resulting Pu-239/U-238 Concentration Ratios Calculated for Samples A,B and R

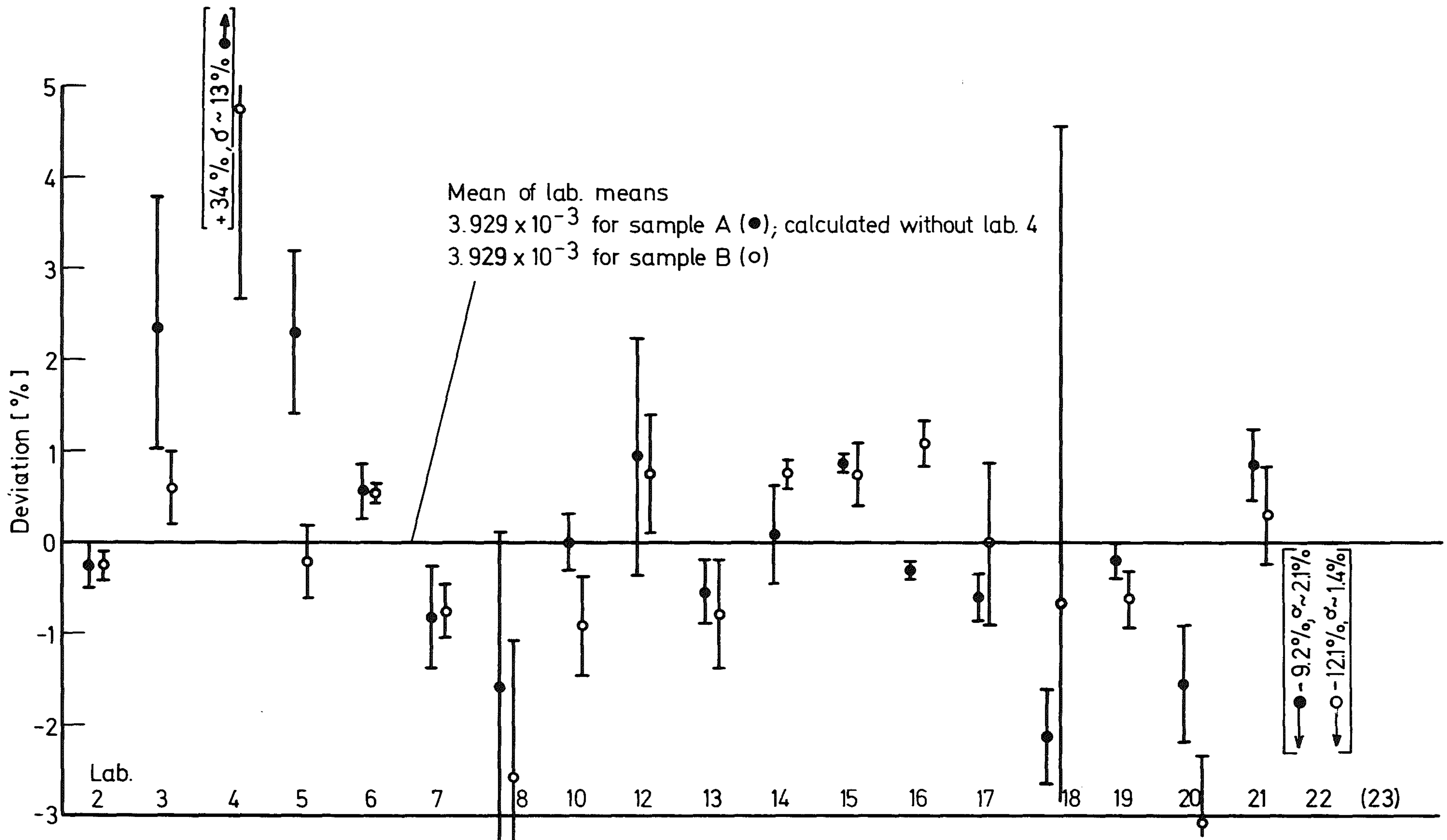
Lab. Code	Sample A: Concentration U-238 [x10^18 atoms/g sol.]	Sample A: Concentration Pu-239 [x10^16 atoms/g sol.]	Sample A: Atomic ratio Pu-239/U-238 [x 10^-2]	Sample B: Concentration U-238 [x10^18 atoms/g sol.]	Sample B: Concentration Pu-239 [x10^16 atoms/g sol.]	Sample B: Atomic ratio Pu-239/U-238 [x 10^-2]	Sample R: Concentration U-238 [x10^18 atoms/g sol.]	Sample R: Concentration Pu-239 [x10^16 atoms/g sol.]	Sample R: Atomic ratio Pu-239/U-238 [x 10^-2]
2	2.944	1.732	0.5883	2.802	1.632	0.5824	2.770	2.081	0.7513
3	2.922	1.713	0.5862	2.794	1.631	0.5838	2.811	2.094	0.7449
4	2.922	(2.644)	-	2.795	(2.261)	-	2.770	(2.206)	-
5	2.928	1.696	0.5792	2.790	1.622	0.5814	2.732	2.129	0.7793
6	2.915	(1.513)	-	2.776	(1.597)	-	2.786	(2.382)	-
7	2.939	1.706	0.5805	2.830	1.632	0.5767	2.770	2.107	0.7606
8	2.955	(2.212)	-	2.809	(1.718)	-	2.747	(2.307)	-
10	2.935	1.695	0.5775	2.787	1.626	0.5834	2.779	2.092	0.7528
12	2.929	1.709	0.5835	2.779	1.632	0.5873	2.781	2.104	0.7566
13	2.911	1.711	0.5878	2.786	1.628	0.5844	2.767	2.103	0.7600
14	2.907	1.706	0.5869	2.791	1.631	0.5844	2.785	2.099	0.7537
15	2.929	1.711	0.5842	2.813	1.637	0.5819	2.747	2.119	0.7714
17	2.959	1.725	0.5830	2.800	1.628	0.5814	2.769	2.096	0.7570
18	2.936	1.704	0.5804	2.818	1.627	0.5774	2.755	2.111	0.7662
19	2.922	1.698	0.5811	2.784	1.619	0.5815	2.770	2.113	0.7628
20	2.941	1.690	0.5746	2.793	1.606	0.5750	2.766	2.118	0.7657
21	2.920	(1.042)	-	2.770	(1.042)	-	2.822	(3.530)	-
22	(2.979)	(1.728)	(0.5801)	(2.839)	(1.617)	(0.5696)	(2.747)	2.113	(0.7692)
23	2.882	-	-	2.737	-	-	2.764	-	-
Mean of means	2.928	1.707	0.5826	2.792	1.627	0.5816	2.772	2.105	0.7602
SD	0.019	0.012	0.0042	0.020	0.008	0.0034	0.021	0.013	0.0091
RSD [%]	0.64	0.69	0.71	0.73	0.48	0.59	0.76	0.62	1.20
						CBNM	2.785	2.109	0.7573

Concentration values given for samples A and B are those obtained after calibration with sample R
Values in brackets were not used for the calculation of mean value, SD and RSD.



(Mean values per laboratory; error bars indicate ± 1σ - range of these means)

Fig.13-1 IDA-72: MS-Determinations of Isotopic Ratio U235/U238 of Unspiked Samples A and B



(Mean values per laboratory; error bars indicate ± 1σ - range of these means)

Fig.13-2 IDA-72: MS-Determinations of Isotopic Ratio U236/U238 of Unspiked Samples A and B

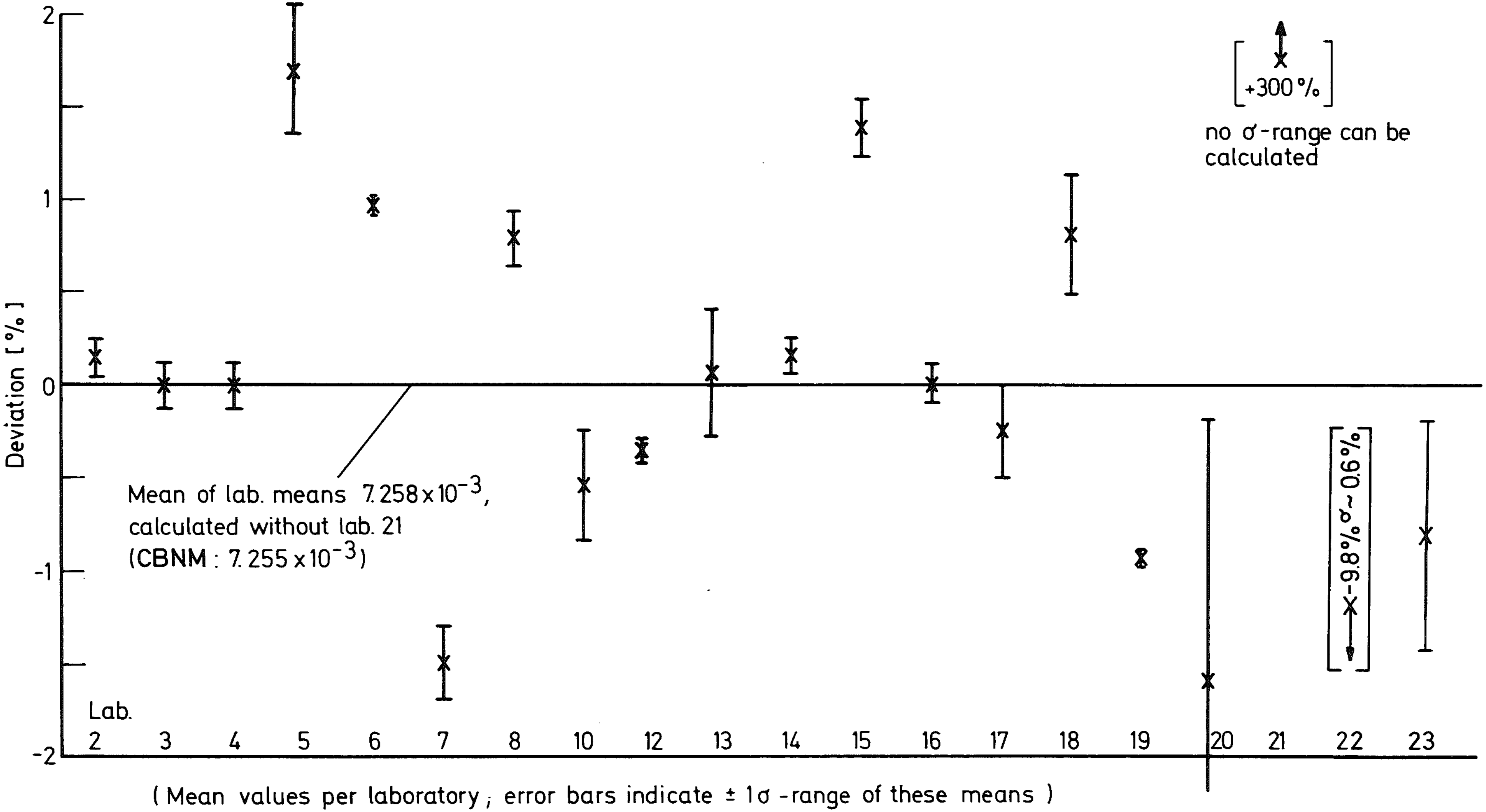


Fig 13-3 IDA-72 : MS-Determinations of Isotopic Ratio U 235 / U 238 of Unspiked Sample R

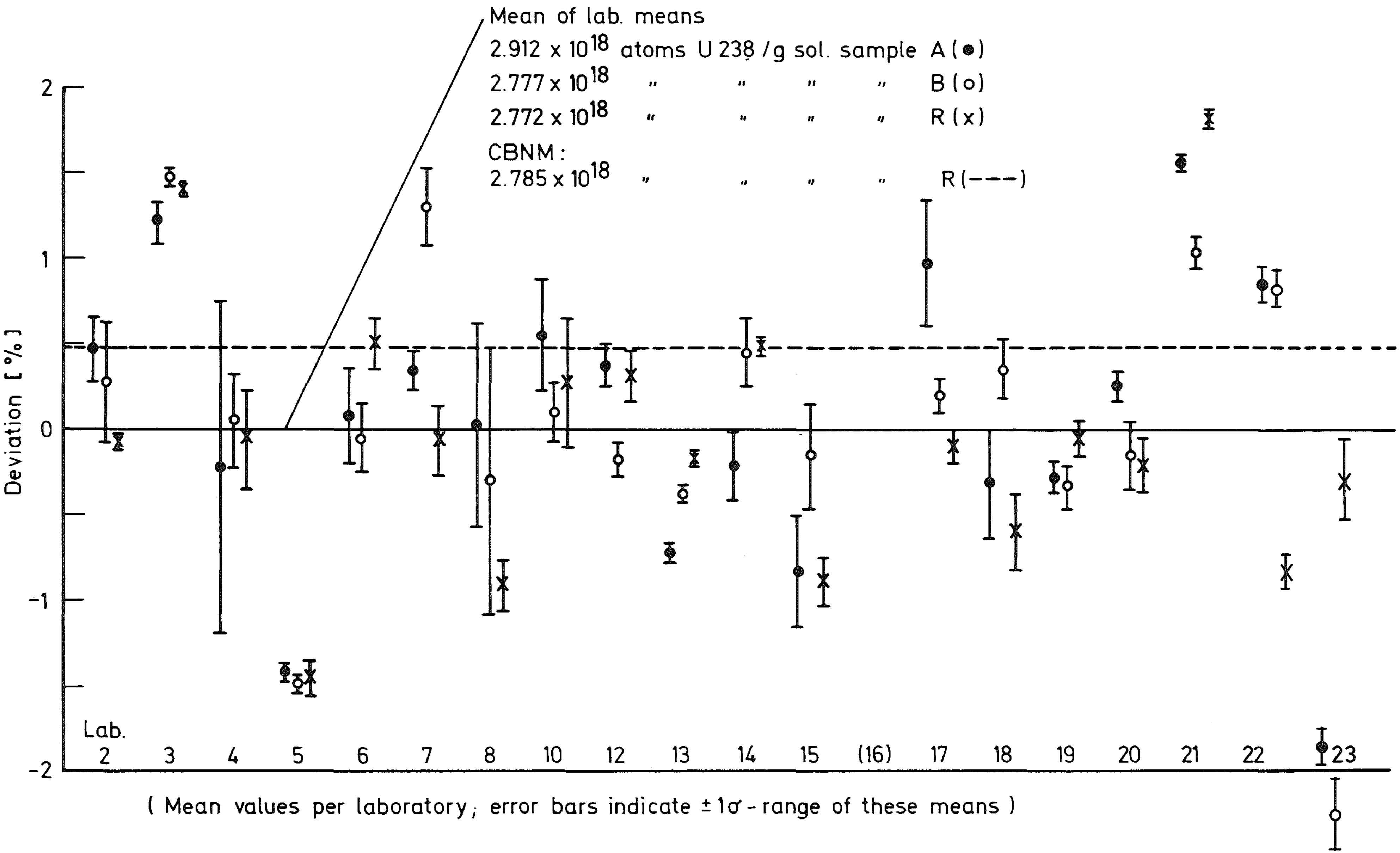
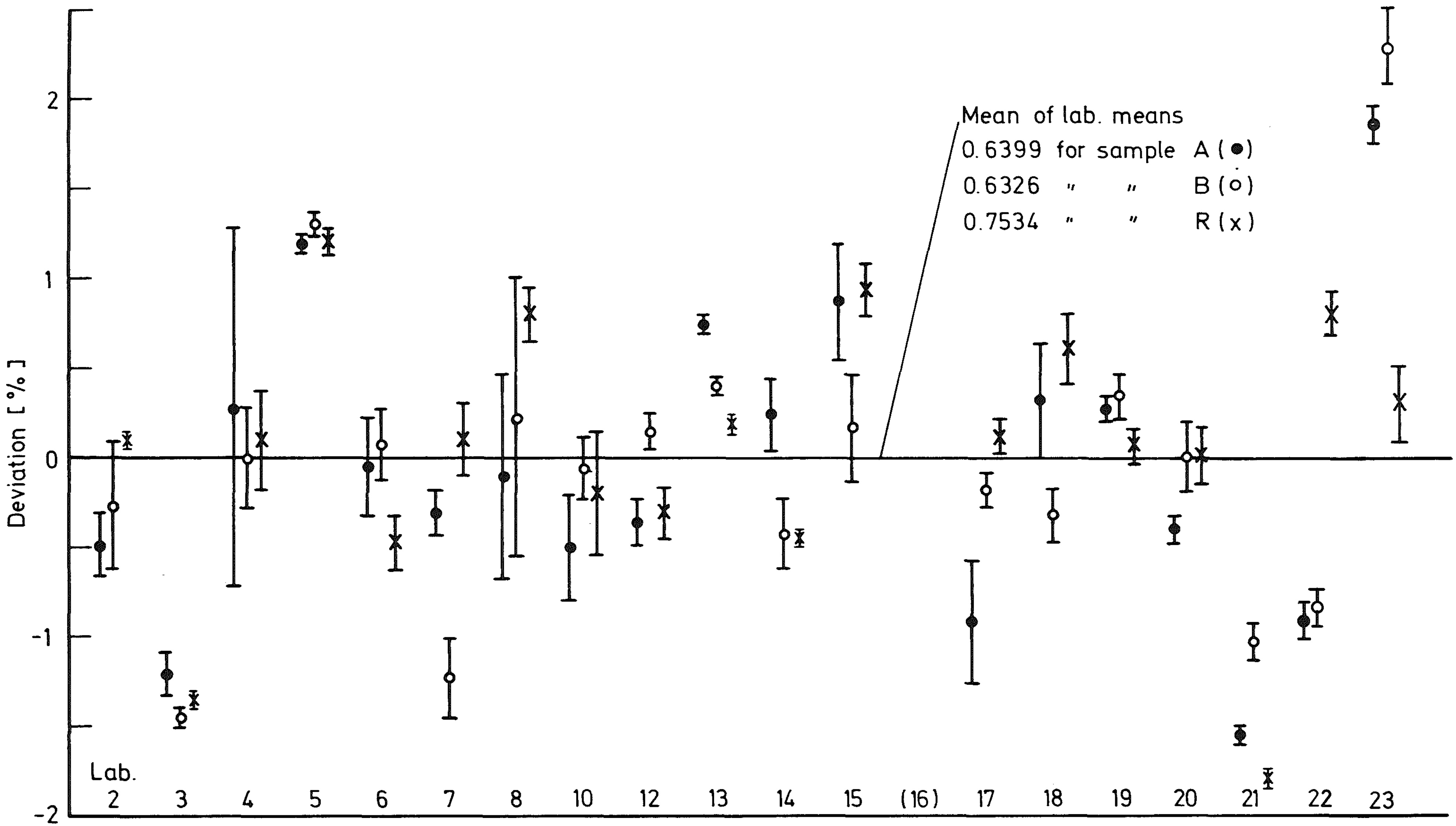
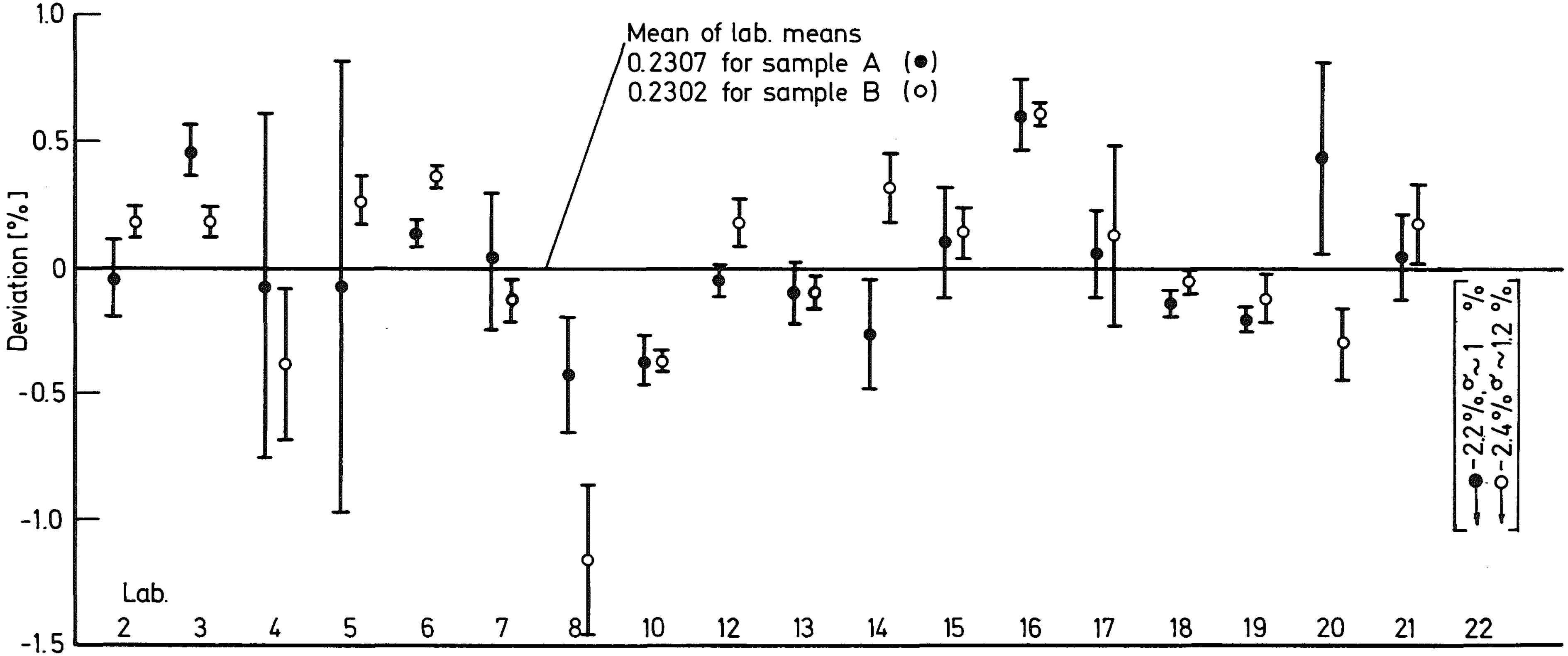


Fig. 13-4 IDA-72 : U238 Concentration of Samples A, B and R



(Mean values per laboratory; error bars indicate ± 1σ - range of these means)

Fig.13-5 IDA-72 : MS-Determinations of Isotopic Ratio U233 / U238 of Spiked Samples A, B and R



(Mean values per laboratory; error bars indicate ± 1σ-range of these means)

Fig.13-6 IDA-72: MS-Determinations of Isotopic Ratio Pu240/Pu239 of Unspiked Samples A and B

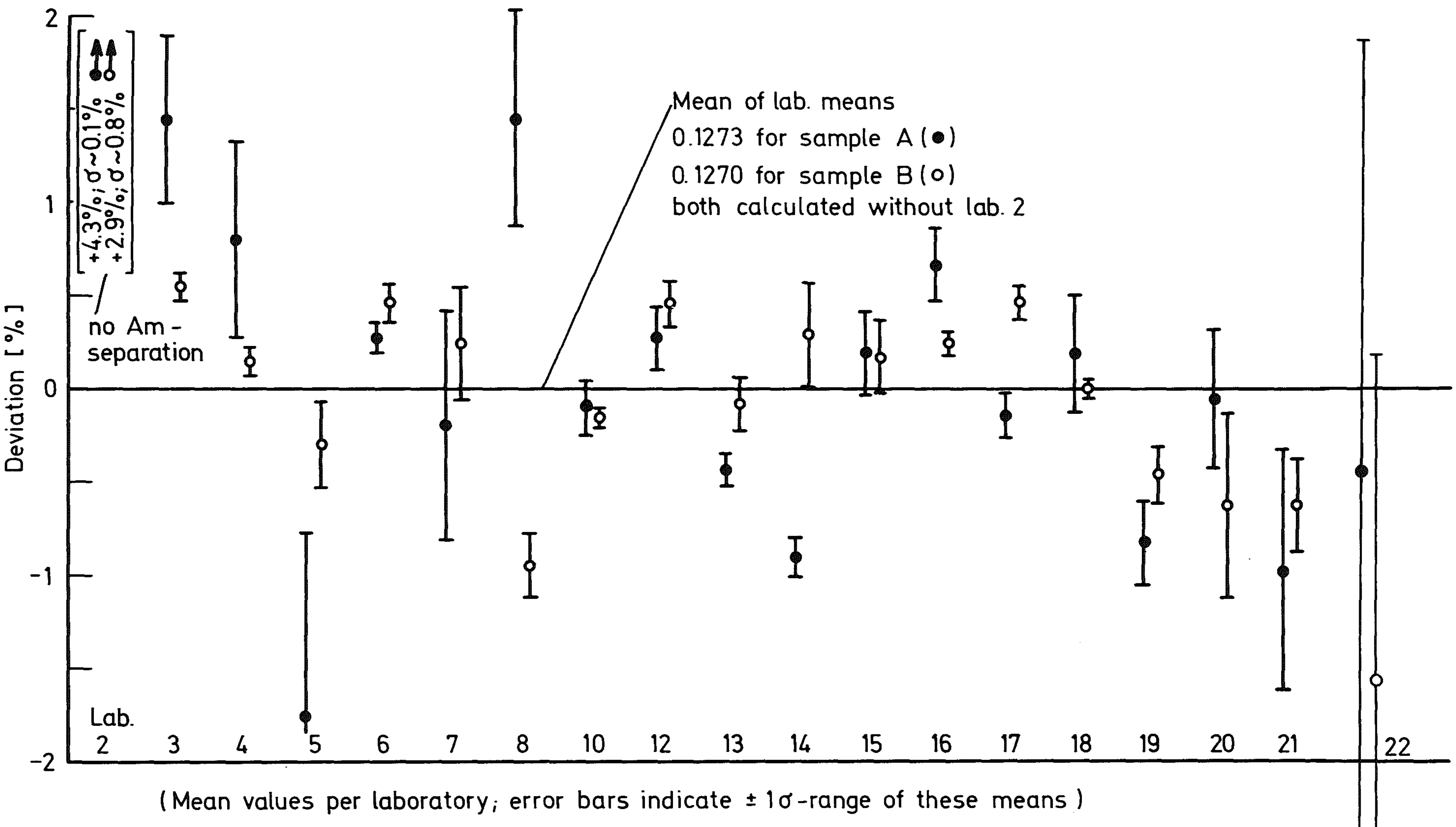


Fig.13-7 IDA-72: MS-Determinations of Isotopic Ratio Pu 241 / Pu 239 of Unspiked Samples A and B

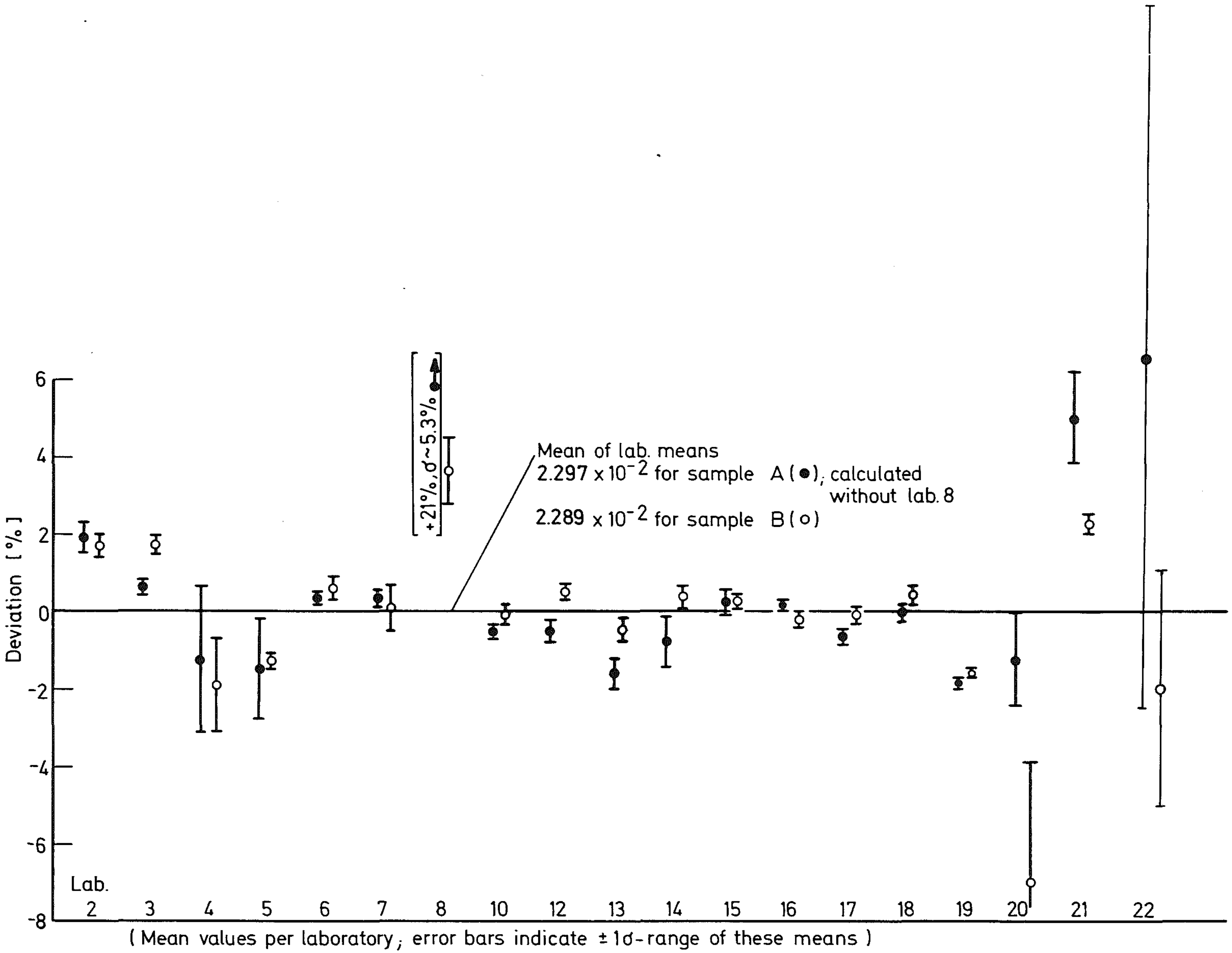
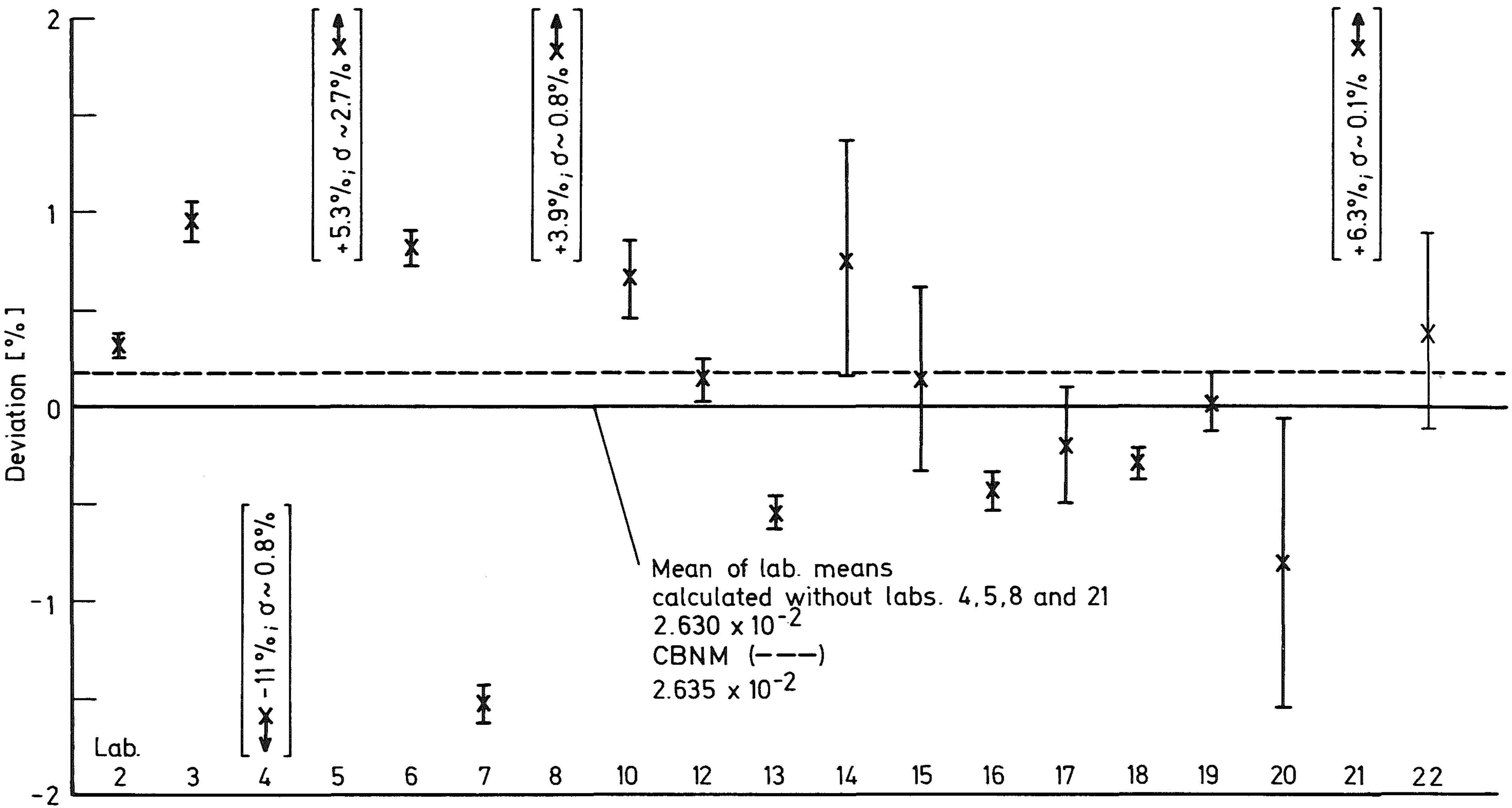
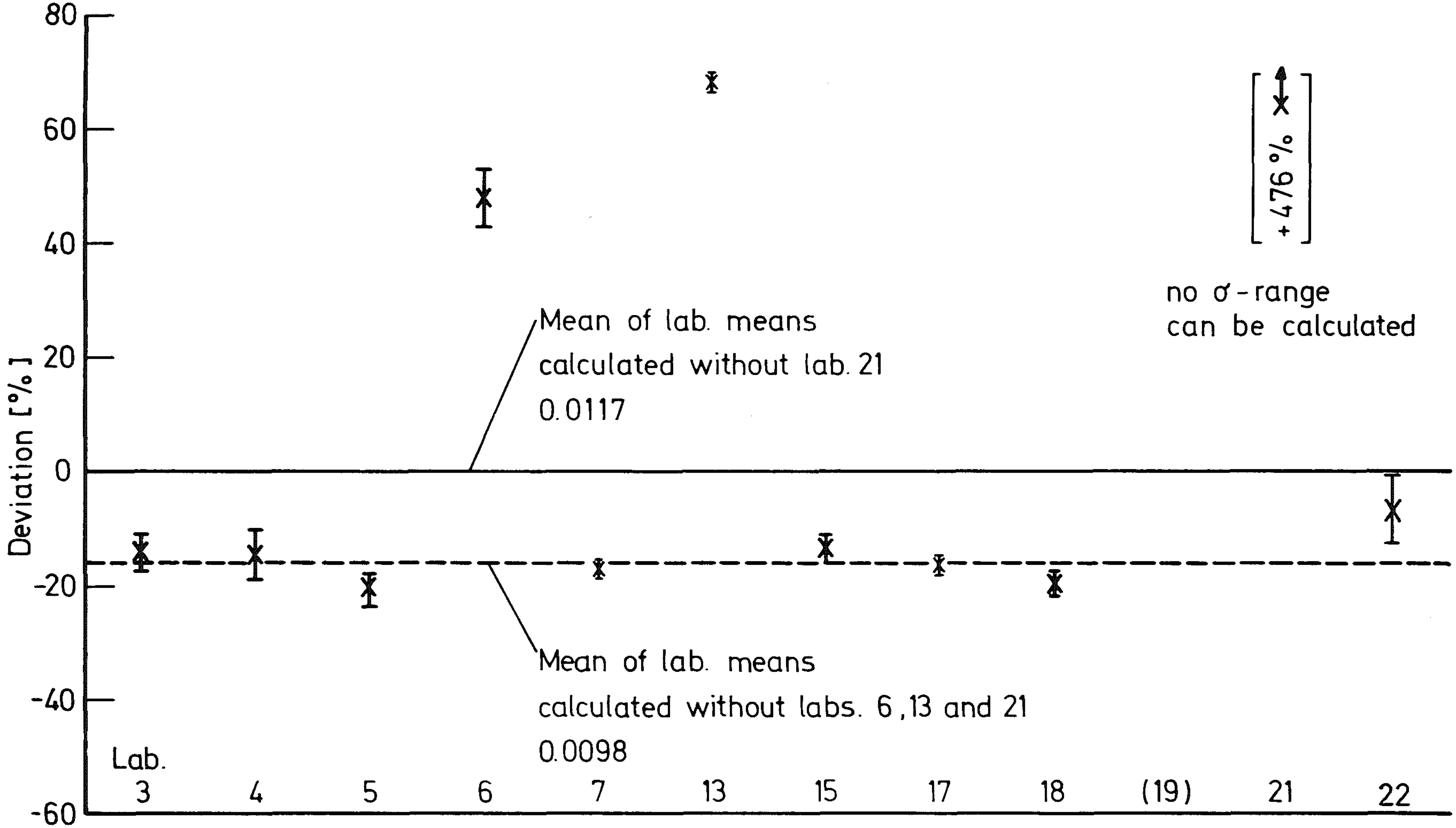


Fig. 13 - 8 IDA-72: MS - Determinations of Isotopic Ratio Pu 242 / Pu 239 of Unspiked Samples A and B



(Mean values per laboratory; error bars indicate ± 1σ - range of these means)

Fig.13-9 IDA-72 : MS - Determinations of Isotopic Ratio Pu 240 / Pu 239 of Unspiked Sample R



(Mean values per laboratory; error bars indicate ± 1σ-range of these means)

Fig.13-10 IDA-72: α-Spectrometric Determinations of the Activity Ratio Pu 238 / (Pu 239 + Pu 240) on the Unspiked Sample R

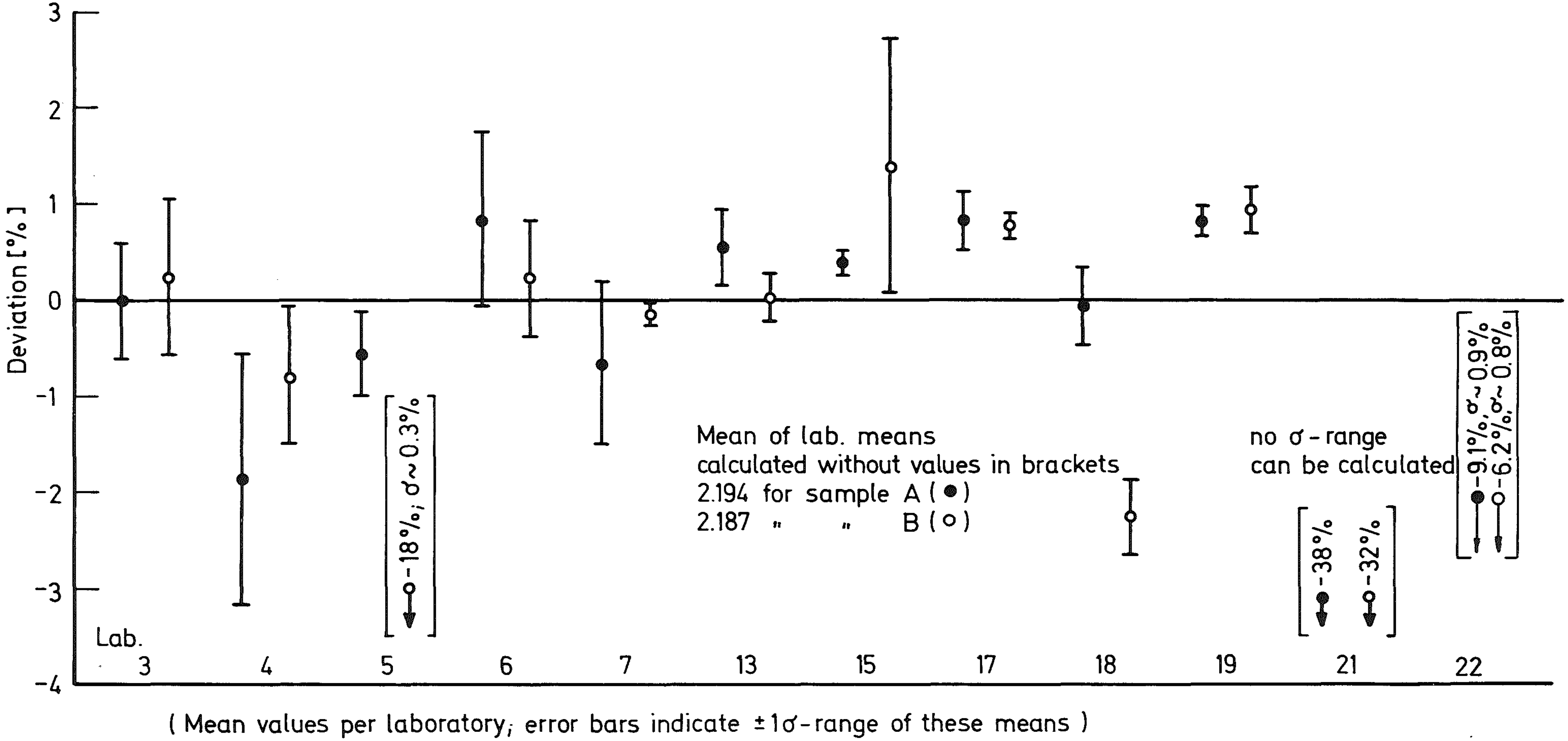
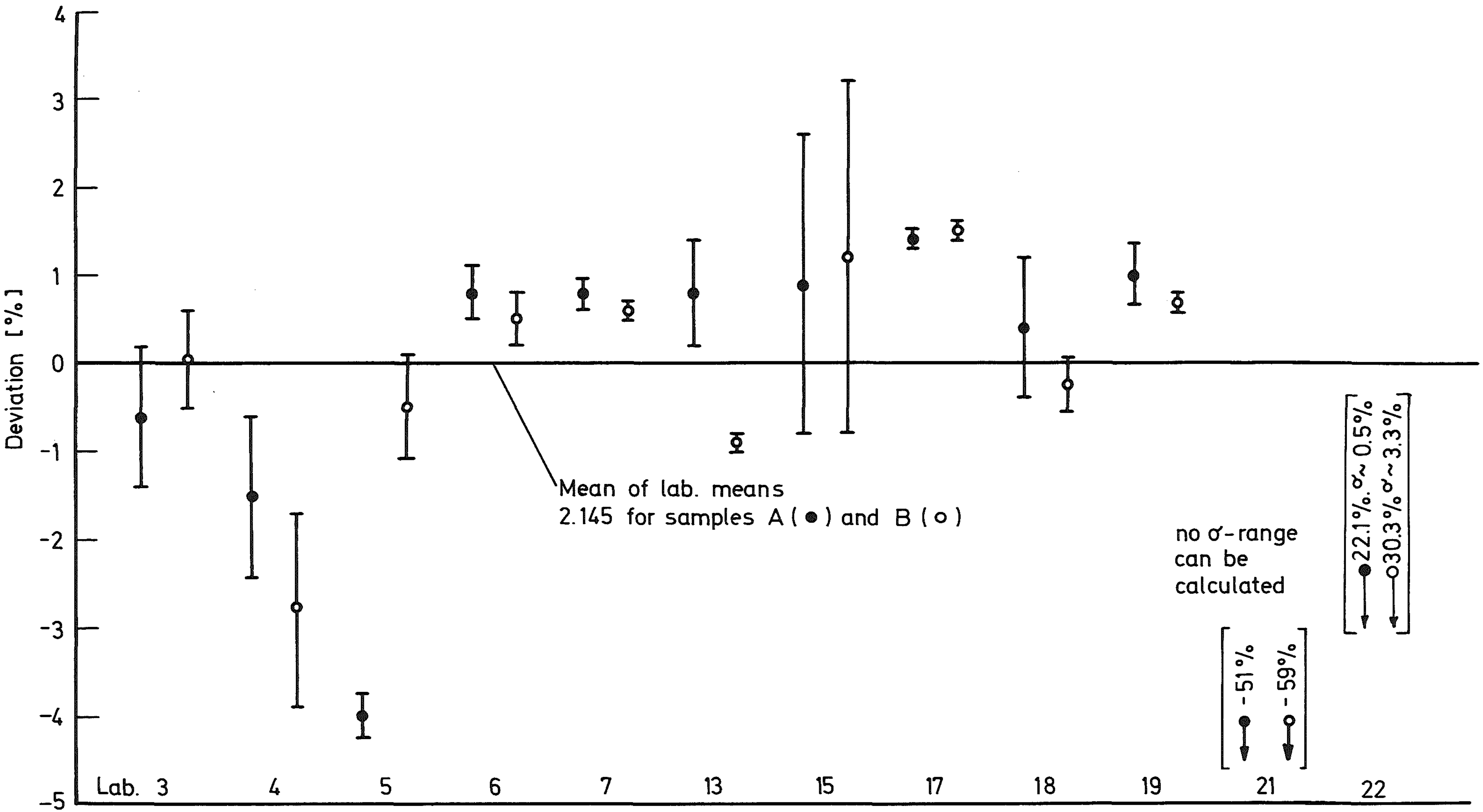


Fig.13-11 IDA-72: α-Spectrometric Determinations of the Activity Ratio Pu 238 / (Pu 239 + Pu 240) on the Unspiked Samples A and B



(Mean values per laboratory; error bars indicate ± 1σ-range of these means)

Fig.13-12 IDA-72: α-Spectrometric Determinations of the Activity Ratio Pu 238 / (Pu 239 + Pu 240) on the Spiked Samples A and B

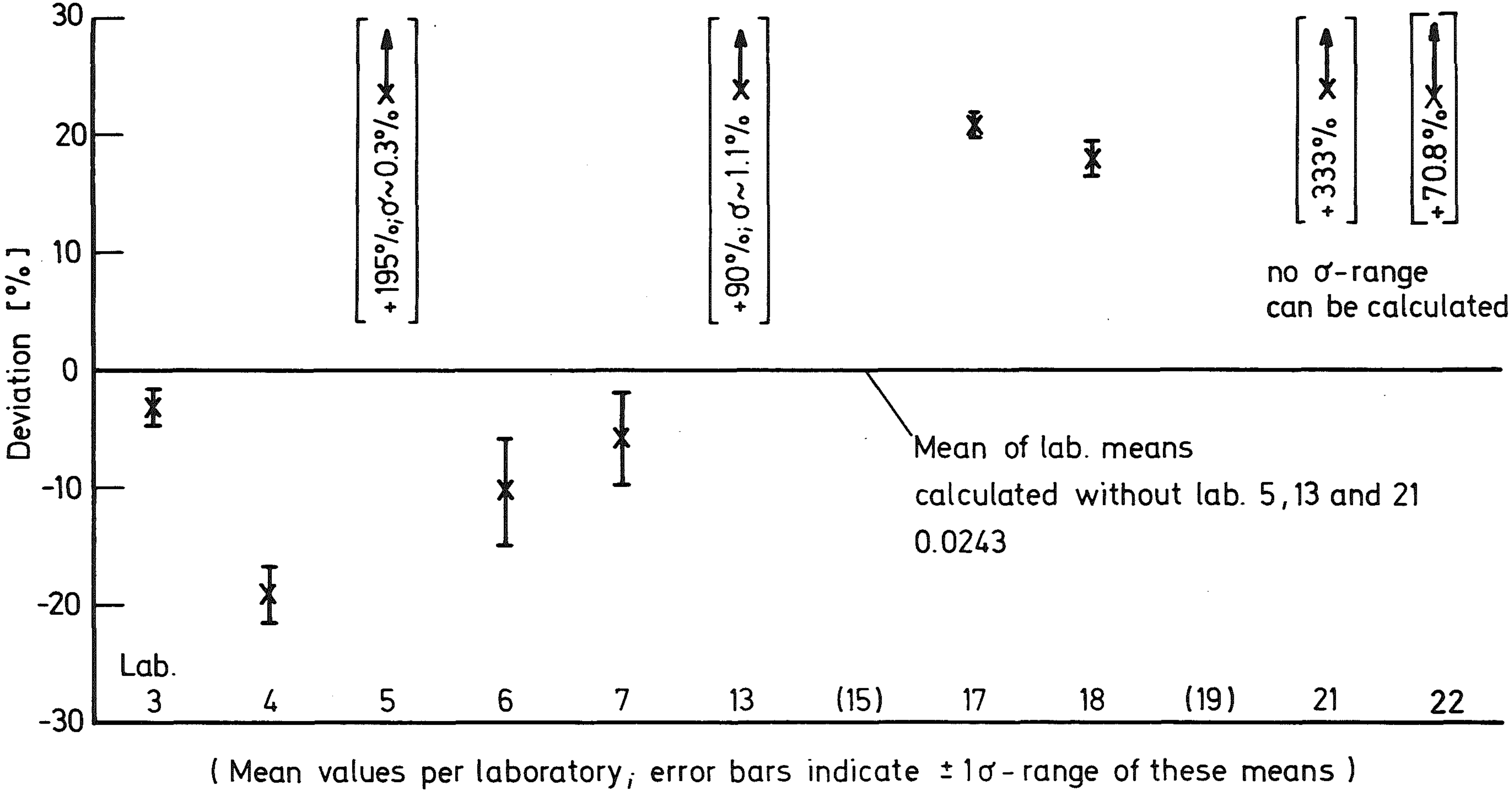
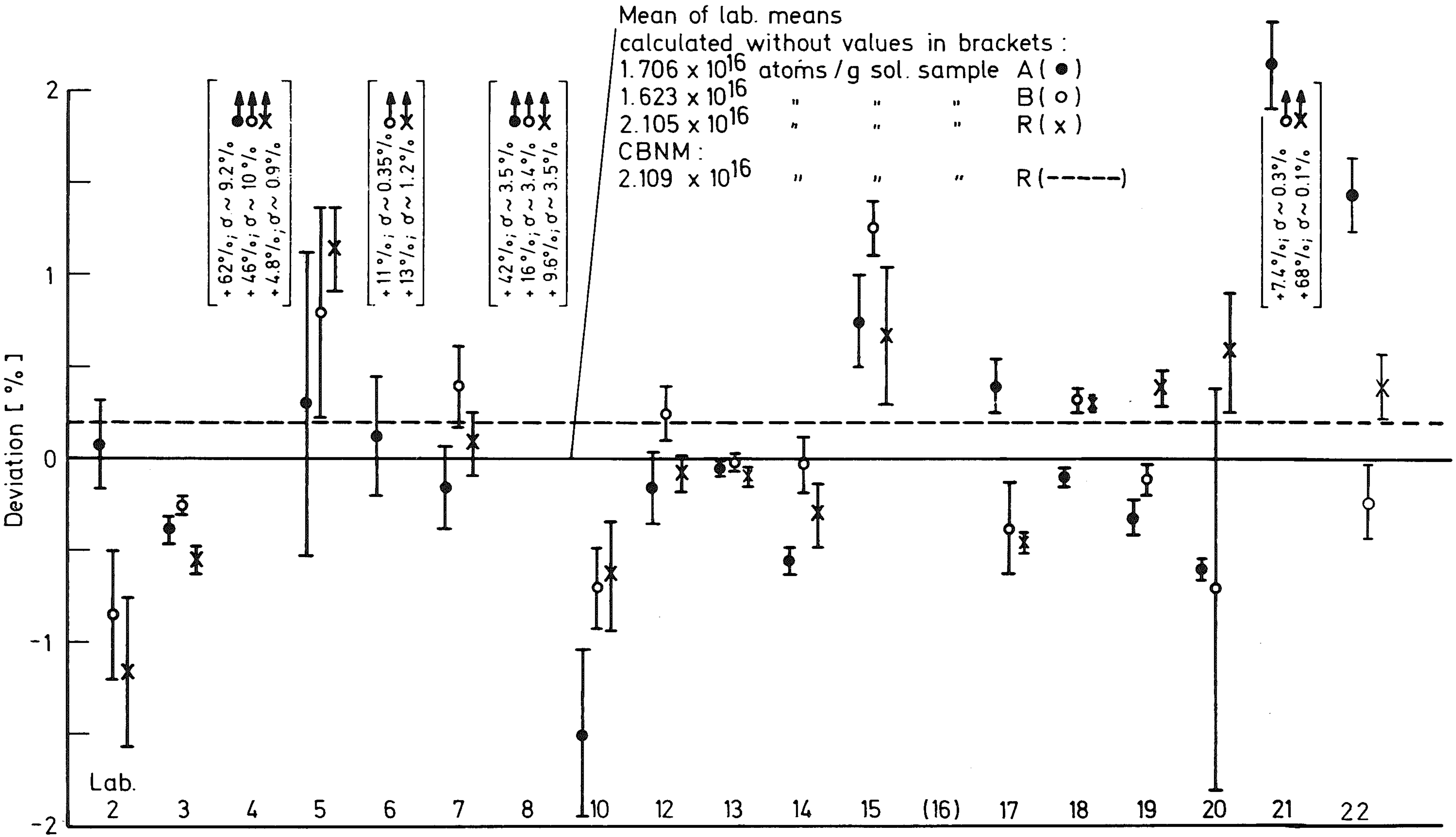
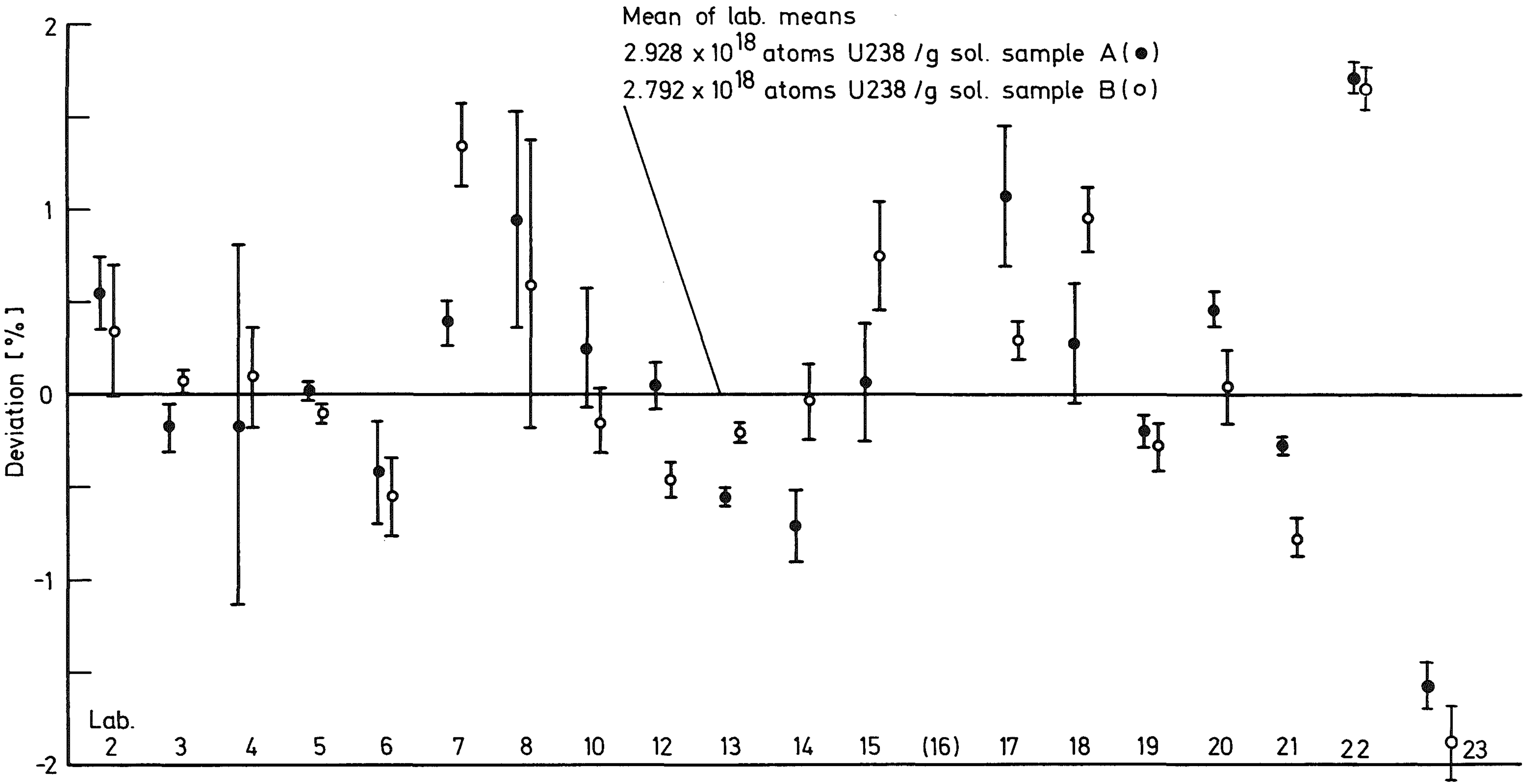


Fig.13-13 IDA-72: α-Spectrometric Determinations of the Activity Ratio Pu 238 / (Pu 239 + Pu 240) on the Spiked Sample R



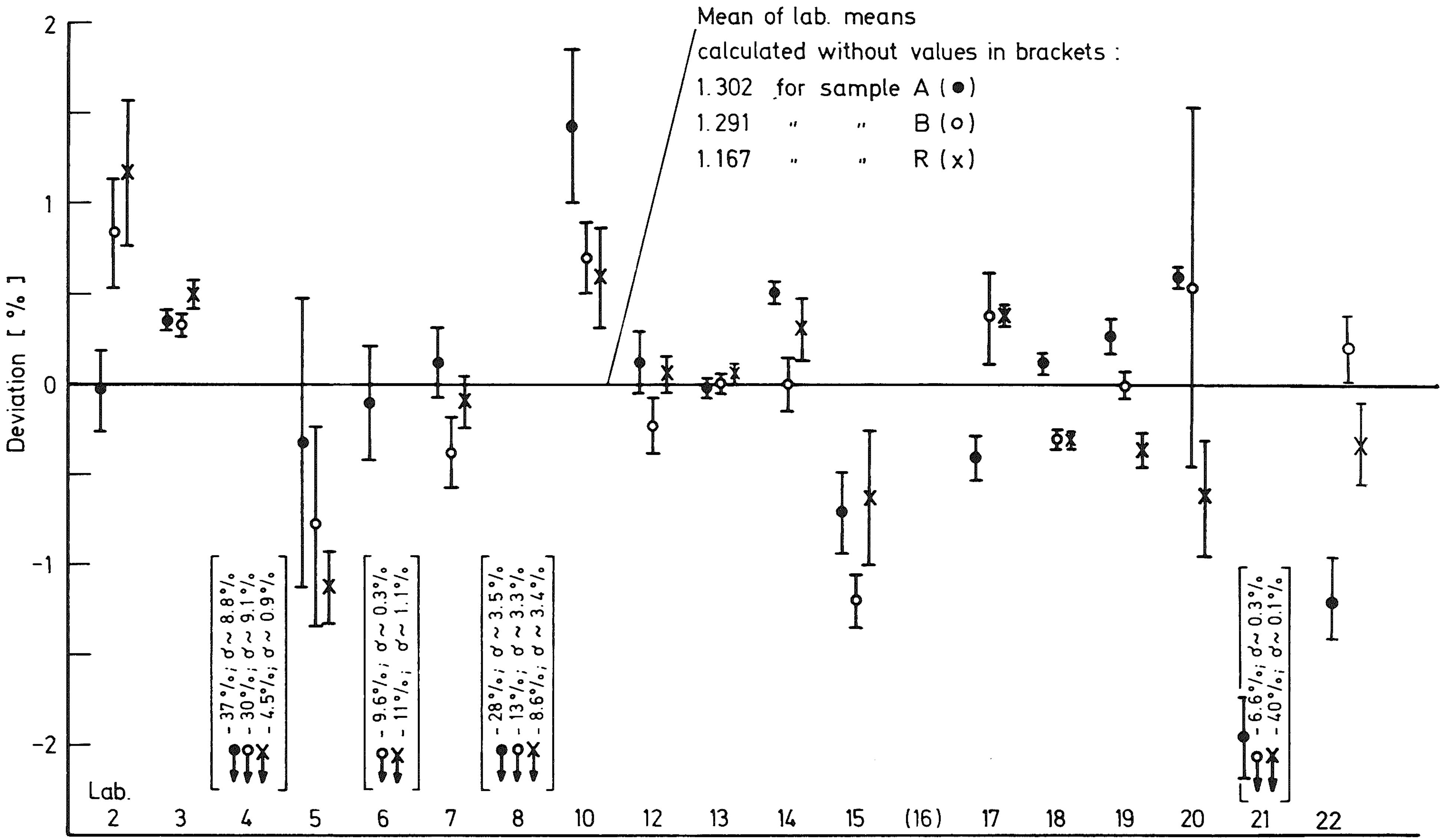
(Mean values per laboratory ; error bars indicate ± 1σ - range of these means)

Fig.13-14 IDA-72 : Pu 239 Concentration of Samples A, B and R



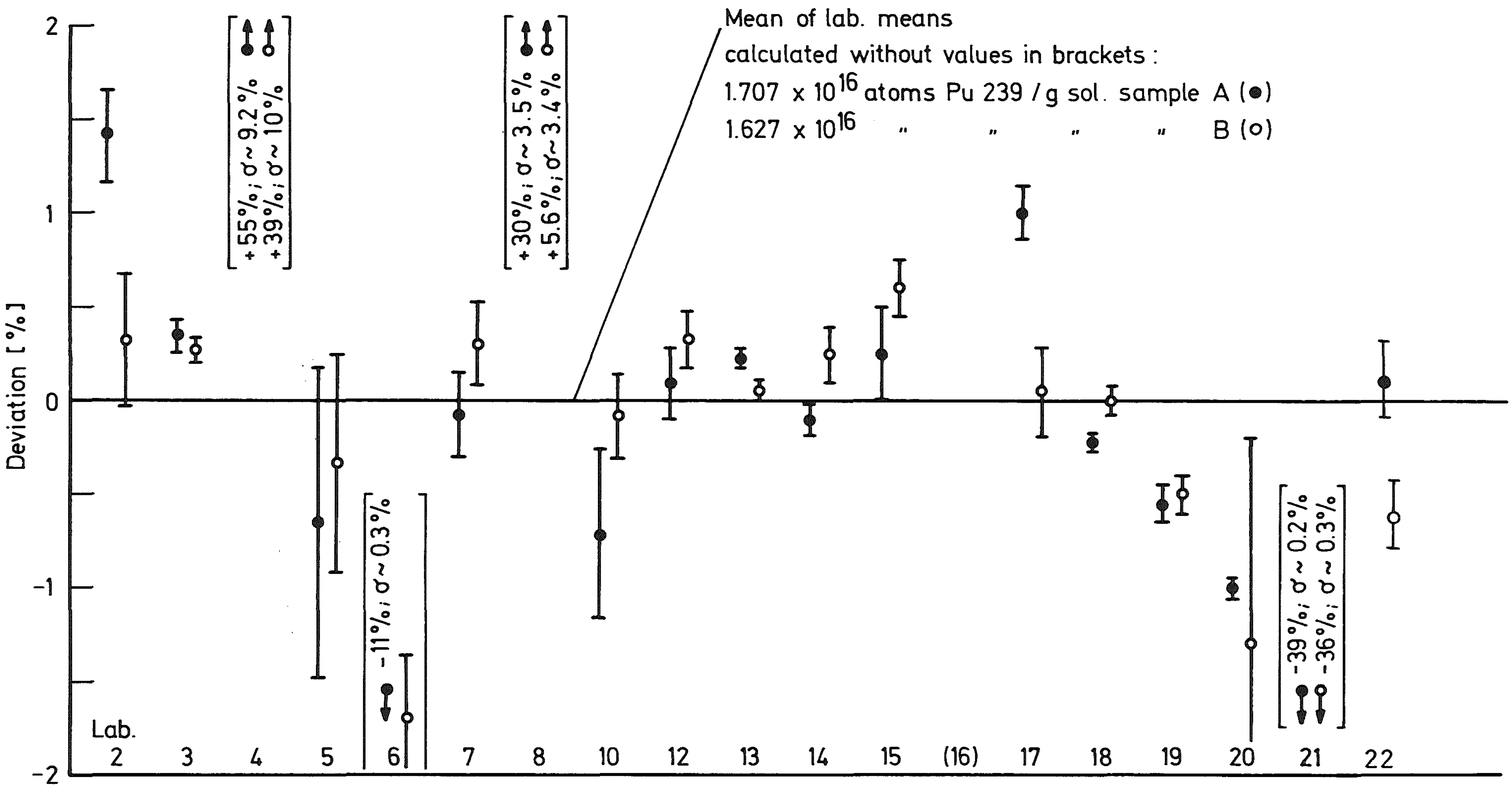
(Mean values per laboratory; error bars indicating ± 1σ-range taken as in Fig. 13-4)

Fig.13-15 IDA-72 : U238 Concentration of Samples A and B after "Calibration" with Sample R



(Mean values per laboratory ; error bars indicate ±1σ-range of these means)

Fig.13-16 IDA-72 : MS - Determinations of Isotopic Ratio Pu 242 / Pu 239 of Spiked Samples A,B and R



(Mean values per laboratory; error bars indicating ±1σ - range taken as in Fig. 13 - 14)

Fig.13 - 17IDA-72: Pu 239 Concentration of Sample A and B after "Calibration" with Sample R

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