# PART A

# RECOMMENDED VALUES FOR ELEMENTS/CONSTITUENTS IN UTS-1 to UTS-4

### INTERLABORATORY PROGRAM

Participating laboratories in the interlaboratory program for the elements/constituents samples are listed in alphabetical order in Table A-1. Each was assigned a code number which bears no relationship to its alphabetical order.

Each laboratory was requested to contribute five replicate results for as many as possible of total iron, titanium, aluminum, calcium, barium, uranium, thorium, total sulphur and sulphate on one bottle of each of UTS-1, UTS-2, UTS-3 and UTS-4 by methods of its choice and to report the results on an "as is" basis. In addition, results for nickel and arsenic were requested for UTS-4. Some laboratories contributed results by more than one method: herein each set was considered statistically independent.

The results of the confirmation of the homogeneity of the tailings samples were included in the interlaboratory program. However, to avoid any biasing of the statistics, only five results, chosen at random out of the 57 available, were used in subsequent calculations. Analytical information is presented in Tables A-2 to A-5. Methodological information is presented in Table A-6 and pertains to all samples with the exception of nickel and arsenic.

### STATISTICAL TREATMENT OF ANALYTICAL RESULTS

The consensus values and related statistical parameters were calculated as described above after outlying results were removed. Any sets of results obviously suspect for methodological reasons were rejected. Sets having unusually high variance were examined and any individual outlying results were deleted. Also, the sets of results whose means differed by more than twice the overall standard deviation from the initially calculated mean value were not used in subsequent computations to avoid biasing the statistics. All results that were rejected are identified in Tables A-2 to A-5.

The consensus values and related statistical parameters are summarized in Table A-7.

#### DISCUSSION

Table A-6 is a summary of a methodological classification of accepted analytical results where there is a clear-out distinction between types of methods in decomposition, separations and determination steps. No attempt was made to detect a statistically significant difference between the overall means of the more common methods for any element or constituent.

The consensus values of the interlaboratory program have been given recommended value status if there were at least nine sets of results and if the between-laboratory agreement was judged on the basis of chemical experience to be reasonable. The values for sulphate in UTS-3 and nickel in UTS-4 do not satisfy these criteria.

The between-laboratory agreement is, in many cases, not as good as is found in general in the interlaboratory programs of CCRMP, but it is, nevertheless, still acceptable to use these tailings samples as reference materials. Previous experience in CCRMP is that magnitude of the uncertainty in a consensus value has little effect on the actual estimation of the consensus value if the number of sets of results is sufficiently large.

#### Approximate Values

Laboratory 1 provided approximate values for the concentration of SiO<sub>2</sub>, Na<sub>2</sub>O and K<sub>2</sub>O; they are reported in Table A-7.

#### Sulphur Control

The ratio of sulphate sulphur to total sulphur is an important parameter with respect to the potential environmental hazard posed by uranium tailings as a result of acid generation due to oxidation processes. The values of the ratios for UTS-1 and UTS-4 indicate that most of the sulphur is already present as sulphate and therefore should pose few problems with respect to acid generation. The low total sulphur content of UTS-3 is of course due to prior pyrite mineral separation by flotation. UTS-2 on the other hand contains appreciable amounts of oxidizable sulphur that can lead to deleterious acid generation, a phenomenon which is now being studied in detail in the Elliot Lake area.

#### Table A-1 - Contributing laboratories

Acme Analytical Laboratories Ltd. Vancouver, British Columbia (Dean Toye) Contract 15SQ.23440-2-9144-1

Assayers (Ontario) Limited Toronto, Ontario (J. van Engelen) Contract 26SQ.23400-5-9101-2

Atomic Energy of Canada Limited, Radiochemical Company Kanata, Ontario (B.F. Raby)

Barringer Magenta Limited Calgary, Alberta (C.D. Read) Contract 15SQ.23440-2-9144-2

Barringer Magenta Limited Rexdale, Ontario (R.E. Lett) Contract 15SQ.23440-2-9144-3

Becquerel Laboratories Inc. Mississauga, Ontario (R. Robertson) Contract 15SQ.23440-3-9116-1

Bondar-Clegg and Company Limited Ottawa, Ontario (P. Haulena) Contract 15SQ.23440-3-9144-4

Bondar-Clegg and Company Limited North Vancouver, British Columbia (K.E. Rogers) Contract 15SQ.23440-3-9144-5

CAN TEST Limited Vancouver, British Columbia (R.S. Jornitz) Contract 15SQ.23440-3-9144-11 Chemex Laboratories Limited North Vancouver, British Columbia (R.D. Morse) Contract 15SQ.23440-3-9144-6

Ecc-Tech Laboratories Limited Kamloops, British Columbia (F.J. Pezzotti) Contract 26SQ.23440-3-9101-1

Kamloops Research and Assay Laboratory Limited Kamloops, British Columbia (D.A. Blundell) Contract 15SQ.23440-3-9144-7

Lakefield Research of Canada Limited Lakefield, Ontario (A.E. Carr) Contract 26SQ.23440-3-9101-4

Materials Research Laboratory Limited Nepean, Ontario (S.K. Singh) Contract 15SQ.23440-3-9144-8

Metriclab (1980) Inc. Ste-Marthe-sur-le-lac, Quebec (H. Blais) Contract 26SQ.23440-3-9101-3

Saskatchewan Research Council Saskatoon, Saskatchewan (G. Smithson) Contract SQ.23440-3-9116-2

Technical Service Laboratories Mississauga, Ontario (A.H. Debnam) Contract 15SQ.23440-3-9144-9

X-Ray Assay Laboratories Limited Don Mills, Ontario (J.H. Opdebeeck) Contract 15SQ.23440-3-9144-10

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[PLASMA]       4.77       4.88       4.97       4.97       4.9140       003         (AA)       4.77       4.88       4.67       4.83       4.7940       004         (AA)       4.74       4.86       4.83       4.794       004         (PLSMA)       4.73       4.74       4.83       4.794       004         (AA)       4.74       4.83       4.794       0.04         (AA)       5.10       5.10       5.10       5.00       0.04         (AA)       5.10       5.10       5.00       5.00       0.04         (AA)       5.10       5.10       5.00       5.00       0.04         (AA)       5.02       4.91       4.91       4.91       4.97       4.88         (AA)       5.02       4.91       4.94       4.83       4.7920       0.04         (AA)       5.02       4.91       4.91       4.91       4.91       4.91       4.91       0.05         (AA)       5.02       4.91       4.91       4.91       4.96       4.96       4.960       0.023         (AA)       5.02       0.51       5.03       5.03       0.023       0.043							MEAN	
(PLASMA)       4.79       4.86       4.467       4.467       4.467       4.467       4.67940       0093         (AA)       4.774       4.883       4.774       4.883       4.7970       0094         (AA)       4.78       4.774       4.883       4.792       0093         (AA)       5.10       5.00       5.05       5.10       0.001       0.043         (TA)       4.78       4.81       4.77       4.83       4.792       0.043         (TA)       5.10       5.00       5.05       5.13       5.03       0.031         (TR)       4.77       4.81       4.81       4.81       4.87       4.87       4.870       0.054         (TA)       5.55       5.13       5.03       5.03       0.034       0.034       0.034         (AA)       5.72       5.13       5.03       4.983       4.983       4.983       0.041       0.043         (AA)       5.72       5.12       4.935       4.983       4.983       0.023         (AA)       4.983       4.883       4.983       4.983       4.983       4.9970       0.033         (PLASMA)       4.965       4.935       4.965								i .
(AA)       4.74       4.83       4.83       4.7940       000         (AA)       4.74       4.83       4.83       4.7940       000         (AA)       4.74       4.83       4.79       4.83       4.7940       000         (AA)       4.78       4.83       4.79       4.83       4.7940       000         (AA)       4.75       4.81       4.75       4.83       4.792       0.043         (TA)       4.75       4.81       4.83       4.93       4.794       4.83       4.7720       001         (AA)       5.17       5.10       5.10       5.064       008       001         (AA)       5.05       5.13       5.13       5.03       0.043       0.043         (AA)       5.05       5.13       5.13       5.03       0.043       0.043         (AA)       5.05       5.13       5.03       0.043       0.043       0.043         (AA)       5.05       5.13       5.045       0.043       0.043       0.043         (AA)       5.05       5.05       5.05       0.043       0.043       0.043         (AA)       4.095       4.935       4.965       4.9	(PLASM	-	θ.	•	. 8	• •	.814	500
AA)       4.683       4.74       4.84       4.92       4.83       4.7940       000         AA)       5.10       5.10       5.05       5.05       5.10       4.83       4.47920       004         AA)       5.10       5.10       5.05       5.05       5.10       4.81       4.7720       004         AA)       5.10       5.10       5.00       5.05       5.03       5.03       4.810       0.61         AA)       5.58       5.72       5.00       5.03       4.810       4.83       4.487       0.043         AA)       5.58       5.72       5.05       5.13       5.03       6.0540       004         AA)       5.69       5.71       4.955       4.93       4.887       4.88700       0.44         PLASMA       4.885       4.935       4.935       4.965       4.98700       0.043         PLASMA       4.965       4.935       4.965       4.88700       0.043       4.9670       0.023         PLASMA       4.985       4.965       4.965       4.965       4.988       4.98700       0.043         PLASMA       0.56       0.58       0.58       0.586       0.5670 <td< td=""><td>AA</td><td>-</td><td>•</td><td>r.</td><td></td><td>8</td><td>794</td><td>040</td></td<>	AA	-	•	r.		8	794	040
PLASMAI       4.81       4.75       4.83       4.83       4.8260       061         AA       5.10       0.01       4.772       0.021       4.80       0.021	AA)	æ.	r.	5	. 8	80	794	040
AA)       4.80       4.84       4.72       4.80       4.720       0.043         TITR)       4.81       4.72       4.83       4.81       4.7720       0.0730         AA)       4.71       4.81       4.72       4.81       4.772       0.043         AA)       4.77       5.10       5.05       5.05       0.054       0.054         AA)       5.58       5.72       5.05       5.10       5.72       0.054       0.054         AA)       5.58       5.72       5.05       5.13       5.713       5.070       0.043         AA)       4.945       4.911       4.744       4.83       4.483       5.722       0.059       0.043         AR       4.945       4.911       4.955       4.965       4.9800       0.043         PLASMA)       4.945       4.955       4.965       4.9800       0.043         PLASMA)       4.946       4.955       4.965       4.9800       0.043         PLASMA)       4.94       4.955       4.965       4.9800       0.043         PLASMA       4.95       4.955       4.965       4.9800       0.043         PLASMA       0.57       0.580	PLASM	æ.	~.	ω.	6.	.00	.828	190
AA)       5.10       5.10       5.0700       004         AA)       5.07       5.0700       004         AA)       5.02       5.10       5.0700       004         AA)       5.02       5.12       5.13       5.03       4.780       4.800         AA)       5.02       5.12       5.13       5.03       4.97       5.480       004         AA)       5.02       4.97       5.12       5.13       5.03       4.970       004         AA)       5.02       4.95       4.95       4.93       4.81       4.790       004         AA)       4.95       4.95       4.95       4.95       4.95       0.43         PLASMA)       4.94       4.83       4.85       4.86       4.87       0.497       0.043         PLASMA)       4.94       4.85       4.85       4.86       4.87       0.48       0.43       0.43         PLASMA)       0.57       0.59       0.58       0.56       0.056       0.043         AA)       0.57       0.58       0.58       0.58       0.58       0.03       0.043         PLASMA)       0.57       0.58       0.58       0.58	A A	.00	•	r.	•	8	262.	640
(IIIR)       4.81       4.78       4.81       4.76       4.81       4.770       0.021         (AA)       5.58       5.772       5.12       5.18       5.79       5.7120       0.084         (AA)       5.58       5.77       5.12       5.13       5.93       5.7120       0.084         (AA)       5.58       5.77       5.12       5.13       5.93       5.7120       0.084         (RLSMA)       5.97       5.72       5.13       5.93       5.7120       0.084         (RLSMA)       5.97       5.12       5.13       5.93       5.7120       0.084         (RLSMA)       5.96       4.995       4.995       4.995       4.985       4.986       9.7120       0.033         (PLASMA)       4.995       4.895       4.895       4.895       4.895       4.986       4.9700       0.043         (PLASMA)       4.995       4.895       4.895       4.895       4.986       4.9700       0.043         (PLASMA)       0.58       0.58       0.59       0.590       0.013       0.013         (PLASMA)       0.59       0.59       0.59       0.590       0.013       0.013         (AA)	(VA)	-		•	•	-	.070	5 40
(AA)       4.75       4.74       4.83       4.81       4.87       4.800       004         (AA)       5.62       4.77       5.63       5.72       5.03       5.703       5.703       5.703       5.703       5.703       5.703       5.703       0.044         (RRF)       5.66       5.72       5.69       5.78       5.72       5.69       5.72       5.03       5.703       5.0240       0.044         (RRF)       5.66       5.72       5.69       5.73       5.93       5.703       0.043         (PLASMA)       4.945       4.85       4.955       4.935       4.965       4.986       4.9700       0.043         (PLASMA)       0.97       4.955       4.955       4.956       4.965       4.965       4.9669       0.44         (PLASMA)       0.97       0.958       0.58       0.561       0.257       0.013         (PLASMA)       0.561       0.57       0.561       0.561       0.561       0.013         (PLASMA)       0.561       0.561       0.561       0.561       0.023       0.013         (PLASMA)       0.565       0.552       0.562       0.023       0.013       0.0103 <tr< td=""><td>(TIT)</td><td>ω.</td><td>~.</td><td>. 8</td><td>1.</td><td>8</td><td>792</td><td>120</td></tr<>	(TIT)	ω.	~.	. 8	1.	8	792	120
(AA)         5.02         4.97         5.12         5.13         5.03         5.0540         008           (AA)         5.68         5.72         5.13         5.03         5.0540         008           (PLASMA)         4.85         4.97         5.12         5.13         5.03         5.566         084           (RLSMA)         4.995         4.985         4.955         4.995         4.9670         043           (RLASMA)         4.995         4.985         4.955         4.985         4.9670         043           (RLASMA)         4.995         4.985         4.985         4.985         4.986         0.43           (PLASMA)         0.57         0.58         0.58         0.58         0.58         0.013           (PLASMA)         0.57         0.58         0.58         0.58         0.58         0.013           (AA)         0.58         0.58         0.58         0.58         0.590         0.013           (AA)         0.58         0.58         0.58         0.580         0.025           (AA)         0.58         0.58         0.58         0.580         0.013           (AA)         0.58         0.58         0.58 </td <td>(AA</td> <td>~</td> <td>~</td> <td>е •</td> <td>8.</td> <td>8.</td> <td>.800</td> <td>054</td>	(AA	~	~	е •	8.	8.	.800	054
(AA)         5.56         5.72         5.69         5.78         5.770         6.471         6.231         6.471         6.231         6.471         6.231         6.471         6.231         6.471         6.231         6.47	4)	••	6.			0	0.54	940
(PLASMA)       4.87       4.91       4.94       4.83       4.965       4.965       4.965       4.965       0.23         (RKF)       4.995       4.995       4.995       4.995       4.965       4.9670       023         (FLASMA)       4.995       4.985       4.985       4.985       4.9650       0.043         (FLASMA)       4.995       4.985       4.985       4.9650       0.033         (FLASMA)       0.57       0.58       0.59       0.59       0.033         (FLASMA)       0.57       0.58       0.58       0.59       0.000         (PLASMA)       0.57       0.58       0.58       0.59       0.000         (PLASMA)       0.525       0.58       0.58       0.59       0.000         (PLASMA)       0.525       0.58       0.58       0.59       0.000         (COLDR)       0.525       0.58       0.56       0.012       0.000         (AA)       0.525       0.58       0.56       0.022       0.022         (AA)       0.525       0.525       0.526       0.022       0.022         (AA)       0.525       0.525       0.526       0.052       0.022      <	(AA	\$.	-	••	2.	~	212	480
(RRF)       4.995       4.995       4.995       4.995       4.995       4.995       4.995       4.995       4.9970       0.023         (FLASMA)       4.994       4.895       4.895       4.995       4.995       4.9970       0.023         TITANLM       TITANLM       TITANLM       4.895       4.995       4.995       4.9970       0.023         TITANLM       0.57       0.595       0.595       0.596       0.590       0.013         (AA)       0.57       0.58       0.59       0.59       0.021         (AA)       0.57       0.58       0.58       0.291       022         (AA)       0.57       0.59       0.59       0.59       022         (AA)       0.57       0.58       0.58       0.29       022         (AA)       0.57       0.59       0.59       023       022         (AA)       0.57       0.58       0.59       058       022         (AA)       0.52       0.59       0.59       059       022         (AA)       0.58       0.59       0.59       059       022         (AA)       0.52       0.59       0.59       059       022	(PLASM		8.	°.	·.	\$	880	770
(PLASMA)       4.94       4.83       4.85       4.85       4.86       4.8700       043         TITANLUM       TITANLUM       TITANLUM       117ANLUM       6.86       4.8700       043         TITANLUM       TITANLUM       TITANLUM       6.85       4.85       4.8700       043         TITANLUM       TITANLUM       TITANLUM       6.85       0.56       013       0.013         TAN       0.57       0.56       0.58       0.58       0.58       013       0000         (AA)       0.57       0.58       0.58       0.58       0.59       013       0000         (AA)       0.57       0.58       0.58       0.58       0.59       026       012         (AA)       0.535       0.552       0.58       0.58       025       025       0000         (AA)       0.58       0.58       0.58       0.58       025       0000       0000         (AA)       0.525       0.58       0.58       0.58       025       0000       0000         (AA)       0.525       0.55       0.55       0.55       025       0000       0000         (COLOR)       0.525       0.55       0	(XRF	66.	.98	.95	. 93	.96	140	0
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TITANIUM       TITANIUM         PLASMA)       0.57       0.56       0.59       0.59       0.013         AA)       0.57       0.58       0.59       0.59       0.013         AA)       0.58       0.58       0.58       0.59       0.013         COLOR)       0.59       0.58       0.58       0.59       0.022         COLOR)       0.54       0.58       0.58       0.59       0.022         COLOR)       0.54       0.51       0.54       0.51       0.022         COLOR)       0.52       0.52       0.52       0.52       0.52       0.025         AA)       0.52       0.52       0.52       0.52       0.05       0.025         AA)       0.52       0.52       0.52       0.52       0.05       0.05         AA)       0.52       0.52       0.52       0.52       0.52       0.05         AA)       0.52       0.52 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>								
PLASMA       0.57       0.56       0.59       0.57       0.58       0.59       0.58       0.58       0.58       0.59       0.013         AA       0.58       0.58       0.58       0.58       0.58       0.59       5620       010         AA       0.58       0.58       0.58       0.58       0.58       0.59       5900       000         AA       0.57       0.58       0.58       0.58       0.58       0.59       5900       002         PLASMA       0.535       0.552       0.58       0.58       0.58       0.59       5740       010         COLDR       0.53       0.552       0.51       0.51       0.51       0.51       5740       010         COLDR       0.52       0.522       0.521       0.525       0.525       0.525       5740       010         COLDR       0.525       0.525       0.525       0.525       0.525       5540       012         AA       0.525       0.525       0.525       0.525       0.525       5580       016         AA       0.525       0.525       0.525       0.525       0.526       0.526       016         AA			TITANIU	Σ				
PLASMA       0.57       0.56       0.58       0.58       0.58       0.58       0.58       0.58       0.58       0.58       0.013       5500       0.103         AA       0.58       0.58       0.58       0.58       0.58       0.58       0.58       0.013         AA       0.58       0.58       0.58       0.58       0.58       0.58       0.013         AA       0.58       0.58       0.58       0.58       0.58       0.58       0.022         PLASMA       0.535       0.598       0.58       0.58       0.58       0.022         PLASMA       0.535       0.598       0.58       0.58       0.58       0.022         PLASMA       0.525       0.517       0.58       0.525       0.525       0.023         COLOR       0.529       0.521       0.46       0.45       0.45       0.053         AA       0.529       0.525       0.45       0.45       0.45       0.05         AA       0.525       0.525       0.45       0.45       0.45       0.05         AA       0.528       0.525       0.45       0.45       0.45       0.05         AA       0.528<								
PLASMA       0.57       0.56       0.58       0.59       0.57       0.58       0.58       0.58       0.58       0.58       0.59       0.013         AA1       0.58       0.58       0.58       0.58       0.58       0.58       0.59       0.013         AA1       0.58       0.58       0.58       0.58       0.58       0.59       0.013         AA1       0.58       0.58       0.58       0.59       0.59       0.59       0.013         AA1       0.58       0.58       0.59       0.59       0.59       0.59       0.013         AA1       0.59       0.59       0.59       0.59       0.59       0.59       0.02         COLDR1       0.51       0.59       0.59       0.51       0.51       0.010         COLDR1       0.529       0.514       0.51       0.51       0.025         COLDR1       0.529       0.517       0.525       0.5212       000         AA1       0.529       0.525       0.525       0.525       0.256       0.256         AA1       0.515       0.525       0.525       0.525       0.526       0.15         PLASMA1       0.525       <								
PLASMA)       0.57       0.56       0.59       0.59       0.59       0.56       0.013         AA)       0.58       0.58       0.58       0.58       0.58       0.58       0.59       0.000         AA)       0.58       0.58       0.58       0.58       0.58       0.59       0.000         PLASMA)       0.58       0.58       0.58       0.58       0.59       0.59       0.000         PLASMA)       0.58       0.58       0.58       0.58       0.58       0.59       0.02         COLDR)       0.59       0.59       0.59       0.59       0.59       0.02         COLDR)       0.525       0.51       0.51       0.51       0.01         COLDR)       0.529       0.511       0.51       0.51       0.01         COLDR)       0.529       0.517       0.525       0.32       0.01         AA)       0.525       0.517       0.525       0.465       0.05       0.01         AA)       0.46       0.45       0.46       0.45       0.45       0.05       0.05         AA)       0.525       0.525       0.525       0.525       0.526       0.528       0.528							ΕA	-
PLASMA)       0.57       0.56       0.59       0.59       0.59       0.59       0.59       0.59       0.00         AA)       0.58       0.58       0.58       0.58       0.58       0.59       5900       000         AA)       0.58       0.58       0.58       0.58       0.58       0.59       5900       000         AA)       0.57       0.57       0.57       0.58       0.59       0.59       5900       5000         PLASMA)       0.57       0.57       0.59       0.59       0.59       0.59       5000       5000       5000         PLASMA)       0.57       0.57       0.57       0.59       0.59       0.59       5000							i –	1
AA)         0.58         0.59         0.07         0.02           COLURN         0.514         0.511         0.511         0.511         0.511         0.516         0.25           CULOR         0.525         0.521         0.611         0.525         0.525         0.052         0.05           CULOR         0.526         0.511         0.511         0.525         0.525         0.2212         006           AA         0.525         0.525         0.525         0.46         0.45         0.222         3240         005	(PLASM	ц.	5.	ч. •	÷.	5	63	013
AA)       0.58       0.63       0.58       0.58       0.59       5900       002         PLASMA)       0.535       0.555       0.552       0.544       0.561       5900       007         PLASMA)       0.535       0.555       0.552       0.544       0.561       5900       007         PLASMA)       0.535       0.555       0.552       0.551       0.561       5900       007         COLOR)       0.54       0.51       0.48       0.51       0.34       3300       007         COLOR)       0.529       0.51       0.48       0.51       0.51       012         COLOR)       0.529       0.51       0.46       0.51       0.51       012         COLOR)       0.529       0.51       0.51       0.525       012       010         AA)       0.46       0.45       0.46       0.45       0.45       012         AA)       0.33       0.33       0.32       0.32       0.32       012         AA)       0.525       0.525       0.526       0.525       5360       015         AA)       0.585       0.576       0.576       0.535       5360       015	(AA	•	• 5	<b>د</b> .	5	5	800	0000
PLASMA)       0.535       0.555       0.552       0.544       0.561       5494       007         COLDR)       0.33       0.33       0.33       0.34       33300       007         COLDR)       0.53       0.33       0.34       33300       007         COLDR)       0.54       0.51       0.48       0.51       5160       025         COLDR)       0.57       0.51       0.51       0.51       0.01       5160       025         COLDR)       0.529       0.514       0.521       0.51       0.61       025         COLDR)       0.529       0.514       0.521       0.51       0.051       025         AA)       0.46       0.45       0.46       0.45       0.4600       012         AA)       0.33       0.33       0.32       0.32       0.32       0.32       0.516       005         AA)       0.525       0.45       0.4600       0.45       0.4600       012         AA)       0.525       0.525       0.526       0.526       0.536       015         AA)       0.525       0.526       0.577       0.586       0.535       5580       005         <	( AA )	5	••	5	5.	5	5900	.022
COLDR) 0.33 0.34 3300.007 COLDR) 0.54 0.51 0.48 0.51 5160 025 COLDR) 0.54 0.51 0.48 0.51 5160 025 COLDR) 0.529 0.514 0.51 0.48 0.512 006 AA) 0.48 0.46 0.45 0.46 0.45 4600 012 AA) 0.48 0.45 0.45 0.45 0.45 4600 012 AA) 0.52 0.55 0.55 0.55 0.55 0.55 5360 015 PLASMA) 0.525 0.585 0.586 0.586 0.586 0.646 0.045	(PLASM	. 53	. 55	. 55	• 54	5	549	010
COLOR) 0.54 0.51 0.48 0.51 .5160 025 COLOR) 0.529 0.514 0.521 0.417 0.525 .5212 006 AA) 0.48 0.46 0.45 0.45 0.45 AA) 0.48 0.46 0.45 0.45 0.45 AA) 0.52 0.33 0.32 0.32 0.32 .3240 .005 PLASMA) 0.525 0.54 0.526 0.526 0.526 .015 XRF) 0.585 0.586 0.586 0.586 .5886 .004	COLDR	. 33	. 33	.32	. 33	e	330	200
CULOR) 0.529 0.514 0.521 0.517 0.525 .5212 006 AA) 0.48 0.46 0.45 0.46 0.45 .4600 .012 AA) 0.33 0.33 0.32 0.32 0.32 .3240 .005 PLASMA) 0.52 0.55 0.54 0.55 0.52 .5360 .015 XRF) 0.585 0.585 0.586 0.586 0.586 .064 PLASMA) 0.585 0.582 0.577 0.586 0.586 0.586 .004	(COLOR	•	e.	5	4.	5.	516	025
AA) 0.48 0.46 0.45 0.46 0.45 0.45 0.45 .4600 012 AA) 0.33 0.33 0.32 0.32 0.32 0.32 .3240 005 PLASMA) 0.52 0.55 0.55 0.55 0.55 0.55 0.52 XRF) 0.585 0.585 0.586 0.586 0.586 .064	(COLOR	. 52	.51	. 52	. 51	.52	521	000
A) 0.33 0.32 0.32 0.32 0.32 0.32 .3240 005 LASMA) 0.52 0.55 0.54 0.55 0.52 .5360 015 RF) 0.525 0.525 0.526 0.526 .015 LASMA) 0.585 0.582 0.577 0.586 0.586 0.586 .004	(AA	4.	4.	• 45	• 46	.45	460	012
LASMA) 0.52 0.55 0.54 0.55 0.52 0.52 0.52 15360 015 RF) 0.525 0.535 0.525 0.520 0.535 .5360 006 LASMA) 0.585 0.582 0.577 0.586 0.586 0.586 .004	(AA)	<b>.</b>	e.	e.	m.	m.	324	002
KFJ 0.525 0.535 0.525 0.520 0.535 .5280 0.66 LASMAJ 0.585 0.582 0.577 0.586 0.586 .586 .004	LASM	. 52	• 55	• 54	• 55	. 52	536	015
LASMA) 0.585 0.582 0.577 0.586 0.586 0.586 .004	KF)	• 52	• 53	.52	. 52	. 53	528	900
	LASM	. 58	• 59	. 57	• 58	. 58	583	40

\*Outliers, not used for computations

Table A-2b - Laboratory results, means and standard deviations for aluminum and calcium in UTS-1

ALUMINUM

S.D.	.0619 .0644 .1746 .0589 .05893 .0192 .0199 .0199	S.D. S.D.
MEAN	Ф Ф Ф Ф Ф Ф Ф Ф Ф Ф Ф Ф Ф Ф	Mm Mm Mm Mm Mm Mm Mm Mm Mm Mm Mm Mm Mm M
	6.30 6.293 6.255 6.335 6.335 6.235 7.2557 7.2557 7.2557 7.2557 7.2557 7.2557 7.25577 7.255777 7.2557777777777	4 6 6 6 7 6 7 6 7 6 7 6 7 6 7 7 7 8 6 7 7 7 8 6 7 7 7 8 6 7 7 7 8 6 7 7 7 8 6 7 7 7 8 6 7 7 7 7
	6.30 6.192 6.30 6.211 6.211 6.211 6.211 6.211	4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
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	6.19 5.895 5.895 5.895 5.45 6.23 6.23 6.22 6.22 6.22 6.22 6.22	4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
	6 6 6 6 6 6 6 7 9 6 6 6 7 9 9 9 9 9 9 9	4 5 5 5 5 5 5 5 5 5 5 5 5 5
	- 1 (PLASMA) - 2 (AA) - 3 (AA) - 3 (PLASMA) - 4 (AA) - 7 (AA) - 7 (AA) - 9 (PLASMA) -10 (XRF) -11 (PLASMA)	LAB- 1 (PLASMA) LAB- 2 (AA) LAB- 2 (AA) LAB- 3 (AA) LAB- 3 (PLASMA) LAB- 3 (PLASMA) LAB- 4 (AA) LAB- 7 (AA) LAB- 7 (AA) LAB- 7 (AA) LAB- 9 (PLASMA) LAB- 10 (XRF) LAB-10 (XRF) LAB-11 (PLASMA) LAB-11 (PLASMA)
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MEAN S.D.	323.60 1.5166 374.00 26.0768 388.00 10.9545 370.00 0.0000 348.2053 487.40 34.2053 487.40 34.2053 352.00 4.4721 352.00 4.4721 344.20 2.9496 307.40 19.7939 246.80 20.7533	18.00 10.954	78.20 3.0332 50.00 3.5355 48.38 2.0179 59.00 6.5192 50.96 1.9013 50.80 1.6432 50.80 1.6432 50.20 8.5849 52.48 2.6395 52.48 2.6395 52.48 1.6432 50.20 8.5849 52.48 1.6432 52.48 1.6432 50.20 1.3033
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	LAB- 1 (PLASMA) LAB- 4 (XRF) LAB- 5 (XRF) LAB- 5 (XRF) LAB- 6 (AE) LAB- 7 (AA) LAB- 9 (PLASMA) LAB-10 (XRF) LAB-11 (PLASMA) LAB-15 (XRF) LAB-17 (AA)	AB-18 (XR	*LAB- 1 (PLASMA) LAB- 2 (FLUOR) LAB- 2 (NAA) LAB- 3 (FLUOR) LAB- 3 (NAA) LAB- 4 (FLUOR) LAB- 4 (FLUOR) LAB- 6 (NAA) LAB- 6 (NAA) LAB- 7 (FLUOR) LAB- 8 (FLUOR) LAB- 9 (FLUOR) LAB- 9 (FLUOR) LAB-10 (NAA)

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lphur in		MEAN S.D.	1	54.80 6 D16	36.00 5 633	34.00 5.477		141 BO 6 2008	100 6 09-07	770 8 00°79 700°7 00°79		31,20 B 757		966.11 00.95 10 10 10	1/2 6 07 20	T89*7 04*17
means and standard deviations for thorium and total sulphur in				50.	30.	ന	41.		43.	5	.20	26.	50	a de	10	-
eviations for the				55.	30.	40	36.	150.	40.	r		23.	00	68	-	88
nd standard de				51.	40.	3	39.	135.	39	0	o	26.	22	38.	30	
	THORIUM			53	40	4	42		5	70.	4	43.	54	3	N	
Table A-2d - Laboratory results, UTS-1				165.0	40.	30.	36.	45.	37.	20	.80	3.8	·6 1	32	56	
Table A-2d				PLA	NAA	( VVV)	PLA	(XRF)	XE	NAA)	COLO	COL	RADI	NAA	NAA	
				-	AB- 2	AB- 3	AB- 3	A8- 4	A 8 = 5	AB- 6	AB- 7	A8- 8	A8- 9	A8-10	A8-11	

Table A-2e - Laboratory results, means and standard deviations for sulphate in UTS-1

SULPHATE

							MEAN	S.D.
LAB- 1	(GRAV)	. 2.463	2.484	2.622	2.580	2.595	2.5488	0703
:	(TITR)	r.	2.76	2.72	2.71	2.72	2.7300	0020.
1	(COMB)	0.88	0.93	0.87	0.91	0.91	0006.	.0245
LA8- 6	-		2.683	2.721	2.715	2.728	2.7084	0188
LA8-	-	. •	2.62	2.66	2 • 69	2.70	2.6700	.0316
8-	(00	1.71	1.68	1.67	1.66	1.69	1-6820	2010.
B	~	٠	2.50	2.47	2.49	2.51	2.5060	9220-
A8-1	(GRAV)	. •	2.52	2.38	2 • 635	2.57	2-5430	0101.
A8-1	-		2.70	2.64	2.65	2.64	2.6560	0.251
*LAB-15	-	1.83	1.83	1.81	1.80	1.84	1.8220	.0164
<b>AB-1</b>	(GRAV)	2.71	2.70	2.69	2.69	2.71	2.7000	
8-1	(CDMB)		• 298	.300	.265	290	- 7830	0182
LA8-18	(GRAV)	2.70	2.70	2.70	2.72	2.71	2.7060	.0089
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MEAN S.D.	3.4340 .0974 3.1120 .0402 3.11660 .0402 3.1660 .0195 3.1840 .0537 3.2200 .0537 3.0680 .0537 3.0660 .0515 3.0740 .0586 3.0710 .0586 3.0710 .0586 3.3340 .0586	MEAN S.D. 2160 .0055 .1400 .0000 .1400 .0000 .1342 .0075 .2040 .0114 .2100 .0212 .2120 .0084 .2120 .0084 .2120 .0084 .2120 .0084 .2120 .0084
	8 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0.21 0.14 0.14 0.13 0.13 0.13 0.15 0.22 0.22 0.22 0.152 0.152
	9 9 9 9 9 9 9 9 9 9 9 9 9 9	0.22 0.14 0.14 0.123 0.123 0.22 0.22 0.22 0.22 0.22 0.22 0.123 0.22 0.123
		0.21 0.14 0.14 0.15 0.24 0.15 0.21 0.15 0.152 0.152
	3.46 3.13 3.14 3.14 3.14 3.24 3.24 3.24 3.24 3.24 3.24 3.24 3.2	0.22 0.14 0.14 0.14 0.143 0.143 0.143 0.143 0.143 0.142 0.143 0.21
	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.22 0.14 0.21 0.21 0.22 0.15 0.15 0.15 0.15 0.15 0.15 0.152
	LAB- 1 (PLASMA) LAB- 2 (AA) LAB- 3 (AA) LAB- 3 (AA) LAB- 5 (AA) LAB- 6 (TITR) LAB- 6 (TITR) LAB- 6 (AA) LAB- 7 (AA) LAB- 7 (AA) LAB- 9 (PLASMA) LAB-10 (XRF) LAB-11 (PLASMA)	LAB- 1 (PLASMA) LAB- 2 (AA) LAB- 2 (AA) LAB- 3 (PLASMA) LAB- 3 (PLASMA) LAB- 5 (CULOR) LAB- 5 (CULOR) LAB- 6 (CULOR) LAB- 6 (CULOR) LAB- 7 (AA) LAB- 8 (AA) LAB- 9 (PLASMA) LAB-10 (XRF) LAB-11 (PLASMA) LAB-11 (PLASMA)

Table A-3b - Laboratory results, means and standard deviations for aluminum and calcium in UTS-2

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MEAN S.D.	2.7160 .0706 2.6080 .0438 2.5660 .0251 2.5660 .0292 2.5680 .02378 2.7780 .0239 2.7780 .0339 2.7780 .0338 2.7780 .0338 2.7880 .0192 2.7880 .0192 2.7880 .0192 2.7880 .0192	MEAN S.D.  .3600 .0071 .4700 .0071 .4700 .0072 .4140 .072 .4140 .0219 .4140 .0219 .4140 .0219 .4258 .0013 .4260 .0130 .4260 .0130 .4260 .0055
	2.70 2.55 2.57 2.57 2.52 2.72 2.80 2.81 2.81 2.80 2.80	0.35 0.35 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47
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	2.83 2.56 2.56 2.56 2.75 2.77 2.77 2.77 2.76 2.79 2.79 2.79 2.79 2.79 2.79 2.79 2.79	
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	482. 682. 6900. 4490. 4400. 4400. 480. 480. 480.	⇒
	(PLASMA) (XRF) (XRF) (XRF) (AA) (AA) (PLASMA) (XRF) (XRF) (XRF) (XRF) (XRF)	(PLASMA) (FLUDR) (ALUDR) (NAA) (FLUDR) (FLUDR) (FLUDR) (FLUDR) (FLUDR) (FLUDR) (FLUDR) (FLUDR) (FLUDR) (FLUDR) (FLUDR) (FLUDR)
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Table A

THOR IUM

S.D.	379	4.9800 4.9800 5.4772 5.4772 6.3485 6.3488 5.4772 4.4385 5.4772 5.4772 4.7719 4.7749	S. D.	.0907 .0000 .0548 .0548 .0283 .0283 .0283 .0283 .0283 .0228 .0228
MEAN	88.2 72.0 68.0	1/9.40 183.00 196.00 206.00 129.20 181.40 158.40 158.40 2	MEAN	м. м. м. м. м. м. м. м. м. м. м. м. м. м
	102	163.0 196.0 200.0 126. 174.0 151.		3.250 3.250 3.44 3.444 3.144 3.11 3.15 3.075 3.15
	P004	196. C 196. C 210. 0 133. 168. 0 168. 0		3.25 3.35 3.55 3.55 3.55 3.55 3.55 3.55
	880	185. 200.0 210.0 157.0 189.0 171. 162.		3.200 3.2000 3.20000 3.20000000000
	202	179-0 200-0 171-0 164- 151-	S(TOTAL)	3.500 3.44 3.44 3.44 3.310 3.26 3.115 3.115 3.115
	89. 70.	177 196-0 210-0 132 215-0 159- 159-		3.340 3.1 3.1 3.50 3.14 3.14 3.14 3.17 3.17 3.17 3.17 3.17
	AB- 1 (PL AB- 2 (NA AB- 3 (NA AB- 3 (PL	4 (XRF) 5 (XRF) 6 (NAA) 7 (COLOR 8 (COLOR 9 (RADIO 9 (RADIO 10 (NAA) 11 (NAA)		LAB- 1 (TITR) LAB- 2 (TITR) LAB- 2 (TITR) LAB- 4 (TITR) LAB- 5 (TITR) LAB- 5 (GRAV) LAB- 7 (GRAV) LAB- 7 (GRAV) LAB- 9 (TITR) LAB- 10 (XRF) LAB-11 (TITR)

Table A-3e - Laboratory results, means and standard deviations for sulphate in UTS-2

SULPHATE

S.D.	79	20	.0241	1	08	24	27	16	0.8	1	03	82	E
MEAN	28	20	.3360	60	46	82	90	74	08	58	00	50	16

0.912 0.94 0.86

0.69 0.65 0.90 0.65

0.91 0.35 0.35 0.925 0.925 0.92 0.675 0.675 0.675 0.92 0.92

> 0.96 0.75 0.675 0.675 0.67

0.95 0.89 0.89 0.675 0.675 0.90 0.90 0.91

0.695

0.91

0.94 0.88 0.68

(GRAV) (COLOR)

(GRAV) (GRAV) (GRAV) (GRAV) (GRAV) (CDMB)

0.896

0.900 8.34 0.91

0.892 8.44 0.94

Outliers, not used for computations

LA8-17

8.24

1.198

1.258

0.35

1.318 0.93 0.31 0.902

1.258 0.92

1.109

(GRAV)

'LAB- 1

0.92

(COM8.)

(GRAV)

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0.895

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LA8-10 LA8-11

LA8-15 LA8-16

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		2.	m.	e.	2.	-	e.	-		4.	8.	-		3.29							~	. 22	2	.20	0.34	.21	~.	.18	~	~	.24	~	
			e	~*	2.	2	3		-	5.	~	-	-	3,32			*				~	~	•	2	0.33	• 54	~	-	2	~	2	.20	
			e	e.	e	-	<b>m</b>	7		2	r.		4.	30			TITANIUM				2	~	.22	2	0.33	• 54	2	.16	2	.24	2	.20	
		3.28	m.	е.	•	•	• •	-	-	en.	٢.		\$.	.34							~	~	• 22	-	0.33	. 27	• •	-	2	• 52	~	.20	v
		_	AB- 2 (AA	AB- 3 (AA)	AB-3 (P	AB- 4 (AA	AB- 5 (AA	A8- 6 (TI	AB- 6 (A	LAB- 7 (AA	8-8 (AA	AB- 9 (PLA	AB-10 (XRF	A8-11 (P							- 1 (P	AB- 2 (AA	AB-3 (AA)	A8- 3 (PLAS	48-4	A8- 5 (COLO	AB- 6 (CDLD	AB- / (AA	AH- B (AA)	A8- 9 (PLA	A8-10 (XRF)	AB-11 (PLA	*Outliers, not used for computations

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5.61     5.61     5.500     5.60     5.60     5.700     0.02       5.00     5.00     5.01     5.40     5.500     5.700     5.700     0.02       5.01     5.03     5.40     5.500     5.700     5.770     0.01       5.03     5.40     5.40     5.40     5.700     0.02       5.03     5.40     5.27     5.93     5.94     0.02       5.03     5.40     5.27     5.915     5.926     0.01       5.03     5.40     5.27     5.926     0.01       5.03     5.915     5.915     5.926     0.01       5.03     5.915     5.915     5.926     0.01       5.04     5.915     5.915     5.915     0.01       5.03     5.915     5.915     5.915     0.02       5.915     5.915							- i	
5.61       5.61       5.56       5.61       5.56       5.60       5.600       0.027         5.700       5.800       5.840       5.940       5.970       5.70       5.70       5.700       0.027         5.600       5.600       5.600       5.600       6.03       5.541       5.68       5.97       5.68       5.970       0.027         5.000       5.01       5.05       5.96       5.97       5.994       6.03       5.70       5.72       5.99       5.91       5.99       5.91				2			MEAN	01
5.700       5.800       5.800       5.800       5.800       5.800       5.700       5.700       5.760       0.021         5.401       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.573       5.5741       5.7600       .041       0.021       0.041       0.031       0.013       0.013       0.013       0.013       0.013       0.013       0.013       0.013       0.013       0.013       0.014       0.013       0.014	1 5	\$	••	.56	9.	5	500	100
5.531       5.605       5.541       5.573       5.594       5.568       0.02         5.600       6.03       5.573       5.594       5.698       0.03         5.600       6.03       5.573       5.594       5.698       0.04         5.600       6.03       5.573       5.594       5.998       0.053         5.600       6.03       5.573       5.998       5.998       0.010         5.603       5.618       5.93       5.998       5.970       0.018         5.913       5.915       5.915       5.915       5.926       0.021         5.913       5.915       5.915       5.915       5.926       0.021         5.913       5.915       5.915       5.915       5.926       0.021         5.913       5.915       5.915       5.915       5.926       0.021         5.913       5.915       5.915       5.915       5.9260       0.021         5.914       5.915       5.915       5.915       5.9260       0.021         5.915       5.915       5.915       5.915       5.9260       0.021         5.915       5.915       5.915       5.915       5.9260       0.023 <td></td> <td>20</td> <td>.80</td> <td>. 80</td> <td>. 80</td> <td>-</td> <td>140</td> <td></td>		20	.80	. 80	. 80	-	140	
5.93       5.98       5.99       6.03       5.99       6.03         6.002       6.03       5.56       5.56       5.56       5.56       5.56       6.03         5.400       5.51       5.57       5.56       5.56       5.56       5.56       5.56       5.56       5.56       5.56       5.56       5.56       5.56       5.56       5.56       5.56       5.57       5.97       5.97       5.99       5.03       5.97       5.99       5.03       5.97       5.99       5.03       5.97       5.99       5.03       5.97       5.99		53	.60	.54	• 57	50	5.00	
5.60       5.64       5.55       5.63       5.66       5.57       5.66       5.66       5.67       5.66       5.66       0.03         5.400       5.51       5.93       5.66       5.93       5.94       5.93       5.940       0.03         5.400       5.61       5.67       5.68       5.93       5.940       5.940       0.03         5.93       5.93       5.93       5.94       5.93       5.948       5.934       0.03         5.93       5.93       5.93       5.94       5.94       5.948       0.03       0.03         5.940       5.93       5.94       5.94       5.94       5.946       0.03         5.93       5.935       5.97       5.99       5.99       5.99       0.03         5.93       5.935       5.975       5.995       5.996       0.03         5.94       5.975       5.975       5.996       0.03         5.93       5.987       5.975       5.996       0.03         5.940       0.022       5.996       0.03       0.03         5.941       5.996       5.996       0.03       0.03         5.941       5.997       5.997       <		0	• 03	.98	. 98	60.	000	100
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5.02       5.04       5.91       5.98       6.02       5.94       5.91         5.93       5.93       5.27       5.93       5.94       0.01         5.93       5.93       5.94       5.99       0.03         5.93       5.95       5.87       5.93       5.94       0.03         5.93       5.95       5.88       5.99       5.996       0.03         5.93       5.95       5.87       5.995       5.996       0.03         5.94       5.995       5.915       5.996       0.029         5.986       5.997       5.995       5.996       0.29         5.995       5.977       5.995       5.996       0.29         5.915       5.977       5.995       5.996       0.29         5.916       0.29       5.977       5.996       0.29         5.916       0.29       5.915       5.996       0.29         5.916       0.29       5.915       5.996       0.29         5.916       0.29       5.915       5.996       0.29         5.916       5.915       5.915       5.996       0.29         5.916       5.915       5.915       5.915		0	•	•	•	0	400.	
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5.90       5.88       5.93       5.94       5.93       5.94       5.94       5.94       5.94       5.94       0.108         5.03       5.885       5.875       5.97       5.99       5.99       0.128         5.03       5.875       5.97       5.99       5.976       0.128         5.96       5.875       5.97       5.99       5.986       0.029         5.98       5.875       5.915       5.996       0.29         5.986       5.99       5.97       5.99       5.99       0.29         5.986       5.915       5.915       5.99       5.99       0.29         5.915       5.99       5.99       5.99       5.99       0.29         5.915       5.915       5.99       5.99       0.029       0.29         5.916       3.47       3.47       3.47       3.46       0.076         4.00       4.00       4.00       4.00       4.00       0.076         3.44       3.56       3.96       3.96       3.976       0.076         3.44       3.56       3.97       3.970       0.070       0.076         3.44       3.56       3.976       3.976       <		4	5	4.	~			
5.93       5.85       5.875       5.875       5.975       5.995       5.996       0.018         5.875       5.875       5.975       5.975       5.995       5.996       0.018         5.875       5.875       5.975       5.995       5.995       5.996       0.018         5.886       5.997       5.997       5.995       5.995       5.996       0.029         5.995       5.997       5.995       5.997       5.999       5.996       0.029         6.03       5.997       5.9915       5.9915       5.996       0.029         6.03       5.997       5.997       5.9915       5.996       0.029         6.03       5.997       5.997       5.997       5.997       0.029         7       3.47       3.47       3.44       3.47       3.44       0.075         4.000       4.000       4.000       4.000       4.000       0.076       0.076         3.44       3.464       3.464       3.464       0.025       4.0720       0.075         3.44       3.47       3.44       3.464       0.025       4.000       4.000         3.44       3.56       3.916       4.016       <		0	.00	6.	0	10		
5.87       5.97       5.97       5.99       5.97       5.996       0.026         6.03       5.95       5.97       5.97       5.995       5.986       0.026         6.03       5.95       5.97       5.97       5.995       5.996       0.026         6.03       5.95       5.97       5.995       5.996       0.026         6.03       5.95       5.97       5.995       5.986       0.026         6.03       5.95       5.995       5.996       0.026         6.03       5.995       5.995       5.996       0.026         6.03       4.00       4.00       4.00       0.025       0.025         6.09       4.00       4.00       4.00       4.00       0.025         6.00       4.00       4.00       4.00       4.00       4.000       0.075         6.01       4.00       4.00       4.00       4.00       4.00       4.00       4.005       0.075         6.02       3.96       3.96       3.97       3.976       0.076       0.076         6.02       4.02       4.02       4.02       4.02       4.02       4.02       4.02         8.67       <	MA) 5	0	eo •	8.	00	0	0076.	500
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3.47       3.50       3.47       3.4640       025         4.09       4.000       4.000       4.000       0.025         4.000       4.000       4.000       4.000       0.025         3.44       3.47       3.44       3.46       0.025         4.000       4.000       4.000       4.000       0.025         3.44       3.47       3.44       3.47       3.46         3.92       3.99       3.47       3.44       3.45         3.92       3.99       3.47       3.44       3.45         3.44       3.97       3.44       3.47       3.44         3.92       3.99       3.91       3.97       3.9700         3.946       3.99       3.97       3.97       3.9700       0.000         3.915       3.91       3.95       3.97       3.9900       0.000         3.925       3.99       3.97       3.9700       0.025       3.9700         4.005       4.008       4.008       4.018       0.027       0.025         4.005       4.008       4.018       3.996       3.995       4.008       4.008       4.008         4.005       4.005       3.								
3.47       3.50       3.44       3.47       3.44         4.09       4.00       4.00       4.00       4.0720       025         4.00       4.00       4.00       4.00       4.00       0.025         3.47       3.47       3.44       3.47       3.44         4.00       4.00       4.00       4.00       4.0720       075         3.44       3.97       3.44       3.47       3.44       3.46       0.025         3.45       3.99       3.99       3.97       3.46       0.075       0.075         3.45       3.99       3.99       3.97       3.990       0.076       0.050         3.46       3.93       3.99       3.97       3.990       0.076       0.050         3.91       3.93       3.99       3.97       3.990       0.076         3.91       4.07       3.99       3.996       3.996       0.076         3.91       4.00       3.99       3.996       3.996       0.076         4.005       4.005       3.996       3.996       0.076       0.086         4.005       4.005       3.996       3.996       0.076       0.032         <							ΕA	0.
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4.09       4.00       4.00       4.00       4.18       4.0720       0750         3.92       3.99       3.81       3.97       3.97       3.97       3.97       0.000       0.000       0.000         3.44       3.52       3.44       3.56       3.97       3.97       3.97       3.97       3.9700       0.000       0.000       0.000       0.000         3.45       3.93       3.93       3.99       3.97       3.97       3.9700       0.075       0.075       0.075         3.45       3.93       3.99       3.99       3.99       3.97       3.9700       0.070       0.075         3.45       3.99       3.96       3.97       3.976       3.9700       0.077       0.077         3.96       3.97       3.995       3.976       3.9700       0.077       0.077         4.07       4.07       3.976       3.976       3.9700       0.077       0.077         4.07       4.07       3.976       3.976       0.076       0.076       0.077         4.08       4.01       3.976       4.015       4.016       0.060       0.077       0.027         4.07       3.975       4.011	) 3.	47	• 5	4.	4.	4.	464	025
$4 \cdot 00$ $3 \cdot 92$ $3 \cdot 99$ $3 \cdot 81$ $3 \cdot 99$ $3 \cdot 97$ $3 \cdot 97$ $3 \cdot 44$ $3 \cdot 52$ $3 \cdot 44$ $3 \cdot 56$ $3 \cdot 97$ $3 \cdot 97600$ $3 \cdot 44$ $3 \cdot 52$ $3 \cdot 44$ $3 \cdot 56$ $3 \cdot 97$ $3 \cdot 97800$ $3 \cdot 44$ $3 \cdot 52$ $3 \cdot 44$ $3 \cdot 56$ $3 \cdot 56$ $3 \cdot 97800$ $3 \cdot 86$ $3 \cdot 93$ $3 \cdot 938$ $3 \cdot 938$ $3 \cdot 97800$ $0 \cdot 0700$ $4 \cdot 077$ $4 \cdot 022$ $4 \cdot 022$ $4 \cdot 028$ $4 \cdot 0286$ $3 \cdot 97800$ $4 \cdot 028$ $4 \cdot 026$ $4 \cdot 026$ $4 \cdot 026$ $4 \cdot 026$ $0 \cdot 0276$ $4 \cdot 028$ $4 \cdot 026$ $4 \cdot 026$ $4 \cdot 026$ $4 \cdot 026$ $0 \cdot 0276$ $4 \cdot 0255$ $4 \cdot 026$ $4 \cdot 026$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 0255$ $4 \cdot 026$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 0255$ $4 \cdot 026$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 0255$ $4 \cdot 026$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 0255$ $4 \cdot 0266$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 0255$ $4 \cdot 0266$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 0255$ $4 \cdot 0266$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 0255$ $4 \cdot 0256$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 02550$ $3 \cdot 97600$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 02550$ $3 \cdot 97600$ $3 \cdot 97600$ $0 \cdot 0276$ $4 \cdot 02550$ $3 \cdot 97600$ $3 \cdot 976000$ $0 \cdot 0276$ $4 \cdot 02550$ $3 \cdot 9760000000000000$	•	0	•	•	0.	-	.072	1012
3.92       3.99       3.81       3.97       3.97       3.97         3.44       3.52       3.44       3.56       3.97       3.9360       060         3.44       3.52       3.44       3.56       3.95       3.97       3.9360       060         3.44       3.52       3.44       3.56       3.95       3.970       060       3.970         3.45       3.93       3.93       3.93       3.93       3.93       3.99       3.970       060         3.46       3.95       4.005       4.006       3.99       3.9740       060         4.07       4.02       4.02       4.08       0.27       4.080       027         4.08       4.02       4.12       4.15       4.06       3.955       3.955       3.9570       032         4.055       4.005       3.976       3.9740       032       4.0570       032         4.055       4.055       4.055       3.9740       032       4.0570       032         4.055       4.055       4.055       3.9740       3.9740       032       4.0560       032         4.055       4.055       4.055       3.9740       3.9740       032	4.	0	•	0.	•	0,	000	000
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4.32       4.27       4.16       4.33       4.15       4.2460       086         4.08       4.09       4.02       4.12       4.09       4.0800       03000       036         3.97       3.92       4.01       3.96       3.95       3.9550       0032         4.055       4.055       4.055       4.07       4.0550       0032         4.00       3.95       3.96       3.950       0032         4.00       3.95       3.96       0.07       4.0550       0032         4.00       3.95       3.96       3.9740       .020       0032		0	0.	•	0.	0.	.048	2007
4.08       4.09       4.02       4.12       4.09       4.0800       0300         3.97       3.92       4.01       3.96       3.95       3.9620       032         4.055       4.045       4.05       4.055       4.07       4.0550       009         4.00       3.95       3.95       4.055       4.07       4.0550       009         4.00       3.95       3.96       3.96       3.95       009       022         4.00       3.95       3.96       3.96       009       009         4.00       3.95       3.96       3.9740       000		m	2	-	<b>m</b>	г.	246	08.6
3.97     3.92     4.01     3.96     3.95     3.9620     032       4.055     4.045     4.055     4.07     4.0550     009       4.00     3.95     3.95     3.96     3.9740     020       4.00     3.95     3.96     3.96     3.9740     020	÷.	0	•	•	ч.	•	.080	080
4.055       4.045       4.055       4.07       4.0550       009         4.00       3.95       3.97       3.96       3.9740       020	) a.	50	6.	•	0.	6.	.962	032
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BARIUM

HAB         1 (PLASMA)         191.0         199.0         191.0         500.           LAB         5 (XFF)         230.0         240.0         270.0         540.0         5								
I (RFS)       530.0       530.0       230.0       230.0       539.0         I (RF)       230.0       230.0       230.0       230.0       239.0       547.20         I (RF)       230.0       230.0       230.0       230.0       230.0       539.47         I (RF)       230.0       230.0       230.0       230.0       230.0       230.0       530.0         I (AS)       279.0       230.0       230.0       230.0       230.0       230.0       230.0         I (AS)       279.0       240.0       240.0       240.0       240.0       244.0         I (LASNA)       279.0       284.0       286.0       280.0       279.0       279.0         I (CLASNA)       214.       218.       211.2       211.2       211.2       211.5       211.60       21.90         I (CLASNA)       214.       218.       211.2       211.2       211.5       211.60       214.00       21.50         I (RF)       214.       218.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0       170.0							EA	S.D
I (RE/SMA)       191.0       202.0       191.0       194.20       5.473         K (RF)       230.0       230.0       230.0       230.0       5.473         K (AF)       230.0       230.0       230.0       230.0       5.473         K (AA)       279.0       230.0       230.0       230.0       5.473         K (AA)       279.0       230.0       230.0       230.0       230.0       5.473         K (AA)       279.0       280.0       230.0       230.0       230.0       5.473         K (AA)       279.0       280.0       280.0       276.40       16.733         K (AA)       279.0       280.0       280.0       276.40       16.733         K (KF)       190.       190.0       180.0       186.0       184.00       14.73         K (KF)       214.2       214.2       214.2       214.2       214.20       16.733         K (AA)       214.2       214.2       214.2       214.2       214.20       16.733         K (AA)       214.2       214.2       214.2       214.2       214.20       16.733         K (AA)       214.2       214.2       214.2       214.2       214.20							1	1
(KFF)       430.       430.       430.       430.       430.       420.       420.       420.       420.       420.       420.       420.       420.       420.       420.       420.       420.       4477       4477       447.	8- 1 (PLASMA	91.	02.	91.	.96	91.	04.7	0 7 0
5 (XFF)       230.0       230.0       230.0       230.0       232.00	B- 4 (XR	30.	30.	30.	20.	20.	10.40	
6 (AE)         230.0 <t< td=""><td>8-5 (XR</td><td>30.</td><td>30.</td><td>40.</td><td>.0.</td><td>00</td><td></td><td></td></t<>	8-5 (XR	30.	30.	40.	.0.	00		
7 (AA)         2790.         270.         210.         730.         210.         270.         210.         270.         210.         270.         210.         270.         210.         270.	8-6 (AE	30.	20.	30.	0.0			007.
8 (AA)       273.0       279.0       264.0       286.0       280.0       135.0       147.1       147       214.7       216.0       24.7       216.0       24.7       216.0       24.7       216.0       24.7       216.0       24.7       216.0       24.7       216.0       214.7       216.0       214.0       216.0       24.7       216.0       214.0       216.0       24.7       216.0       214.0       216.0       214.7       216.0       214.0 <td>8- 7 (AA</td> <td>50.</td> <td>20.</td> <td>.01</td> <td>-0</td> <td></td> <td>0.00</td> <td>4.4/2</td>	8- 7 (AA	50.	20.	.01	-0		0.00	4.4/2
(PLASMA)       204.6       178.0       186.0       165.0       186.0	8-8 (AA	73.	79.	. 79		• •	• • •	6.733
0 (KFF)       190.       190.       190.       190.       194.00       13.50         1 (KFF)       214. <td>B- 9 (PLASM</td> <td>. 40</td> <td>78.</td> <td>44</td> <td></td> <td>• u</td> <td>4.01</td> <td>8.324</td>	B- 9 (PLASM	. 40	78.	44		• u	4.01	8.324
I [FLASMA]       214.       214.       214.       214.00       5.477         I (ARF)       214.       214.       214.       214.00       5.477         I (ARF)       214.       218.       214.       219.       214.00       5.477         I (ARF)       214.       218.       214.       219.       214.00       5.477         I (ARF)       214.       218.       214.       219.       219.00       172.00       8.366         I (AA)       219.       218.       218.       218.       218.       218.       215.00       8.366         I (AA)       510.0       510.0       510.0       510.0       510.0       510.0       510.0         I (AA)       510.0	8-10 (XRF)	00					84.0	3.509
F (KF)       214.       215.       215.       214.       219.       214.       219.       217.2.00       8.366       14.147       219.       219.0.0       172.00       8.366       14.147       219.       219.00       172.00       8.366       14.147       219.00       172.00       8.366       172.00       8.366       172.00       8.366       172.00       8.366       172.00       8.366       172.00       8.366       172.00       8.366       172.00       8.366       172.00       8.366       172.00       8.366       172.00       8.366       172.00       172.00       172.00       172.00       172.00       172.00       18.06       172.00       18.06       172.00       18.06       19.06       100.00       100.00       100.00       100.00       100.00       110.00       110.00       110.00       110.00       110.10       110.10       110.10       110.10       110.10 <td>MOVIDI LL-B</td> <td>-</td> <td></td> <td>2 4</td> <td>2</td> <td>C A</td> <td>84.0</td> <td>.477</td>	MOVIDI LL-B	-		2 4	2	C A	84.0	.477
7 (XFF)         219.         214.         216.         224.         217.20         4.147           7 (XFF)         170.         170.         170.         170.         170.         172.00         8.366           7 (XFF)         160.         170.         170.         170.         170.         172.00         8.366           7 (XFF)         160.         170.         170.         170.         180.         172.00         8.366           7 (XFF)         172.00         516.0         516.0         516.0         516.0         5.366           7 (XFL)         518.0         516.0         516.0         525.0         517.0         518.4           7 (XA)         576.0         576.0         573.06         573.06         573.06         573.06           7 (FUUR)         527.0         571.0         517.0         518.4         528.40         573.06           7 (NA)         527.0         571.0         518.0         518.4         518.40         518.40         518.40           7 (LUDR)         527.0         517.0         517.0         517.0         518.40         518.40         518.40         518.40         518.40         518.40         518.40         518.40		* •		3	2	15	14.6	.190
9 (XRF)         219.         218.         213.         185.         206.20         1572.00         6.366           IRANIUM         URANIUM         URANIUM         170.         170.         170.         170.         150.         172.00         6.366           IRANUM         URANUM         URANUM         180.         180.         180.         172.00         6.366           IRANUM         URANUM         516.0         516.0         516.0         517.0         5.0.           IPLASMA         518.0         516.0         516.0         517.0         518.0         518.0           IPLASMA         518.0         516.0         512.0         517.0         518.0         518.0           IPLASMA         518.0         518.0         512.0         517.0         518.0		*	-	-	9	4	17.2	147
(XKF)       160.       170.       170.       180.       172.00       6.366         URANIUM       URANIUM       URANIUM       172.00       6.366       5.00         URANIUM       516.0       516.0       516.0       516.0       517.0       5.10         FLUDR       557.0       516.0       516.0       516.0       516.0       518.4       3.7815         FLUDR       557.0       516.0       516.0       516.0       517.0       518.40       3.7815         (FLUDR)       570.0       500.0       500.0       500.0       500.00       500.00       27.3861         (FLUDR)       570.0       516.0       516.0       517.0       518.0       518.0       518.0       518.0       518.0       518.0       518.0       518.0       519.0       500.00 </td <td></td> <td>-</td> <td>Ch.</td> <td>-</td> <td>m</td> <td>50</td> <td>06.2</td> <td>5.023</td>		-	Ch.	-	m	50	06.2	5.023
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URANIUM       URANIUM         IPLASMA)       518.0       516.0       516.0       515.0       517.0       5.0         IFLUDR)       5270.0       500.0       550.0       517.0       518.40       3.781         IFLUDR)       5270.0       500.0       516.0       515.0       518.40       3.781         IFLUDR)       5270.0       500.0       510.0       519.0       519.00       519.00       519.00       510.00         IFLUDR)       527.0       520.00       500.00       519.00       510.00       510.00       510.00       510.00       510.00       510.00       510.00       510.00       510.00       510.00       510.00								
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MEAN       518.0       516.0       525.0       517.0       518.40       3.781         (FLUOR)       55000       57000       57000       57000       570.								
MEAN       518.0       516.0       525.0       517.0       518.40       3.781         (FLUOR)       5500.0       516.0       525.0       517.0       518.40       3.781         (FLUOR)       5500.0       516.0       525.0       517.0       518.40       3.781         (FLUOR)       5500.0       516.0       512.0       512.0       517.0       518.40       3.781         (FLUOR)       527.0       518.0       512.0       512.0       512.0       518.0       6.041         (AA)       523.0       518.0       512.0       512.0       515.0       513.00       6.041         (FLUOR)       524.0       518.0       512.0       519.0       500.00       572.7         (FLUOR)       524.0       519.0       520.0       521.0       519.0       572.7         (FLUOR)       524.0       528.0       519.0       523.40       56.83       572.7         (FLUOR)       515.0       518.0       521.0       518.0       572.7       572.83       572.7         (FLUOR)       518.0       521.0       520.0       574.0       578.7       578.7       578.7         (NAA)       515.0       518.0								
(PLASMA)       518.0       516.0       516.0       525.0       517.0       518.40       3.781         (FLUDR)       5500.0       500.0       520.00       517.0       518.40       3.781         (NAA)       527.0       516.0       516.0       512.0       517.0       518.40       3.781         (RAA)       527.0       500.0       500.0       512.0       512.0       519.00       6.041         (RAA)       521.0       512.0       512.0       519.0       519.00       6.041         (RLUDR)       524.0       512.0       519.0       519.0       519.00       519.00       519.00         (RLUDR)       524.0       519.0       528.0       519.0       528.0       519.00       519.00         (RLUDR)       524.0       516.0       528.0       519.0       528.0       519.00       528.0       528.00							ΕA	0
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(NAA)       527.0       523.0       518.0       512.0       515.0       519.0       6.041         (FLUOR)       500.0       500.0       500.0       500.00       500.00       6.040         (NAA)       531.0       519.0       500.0       500.00       500.00       6.040         (FLUOR)       524.0       519.0       528.0       514.0       514.0       519.0       500.00 <td< td=""><td>- 2 (FLUD</td><td>•05</td><td>• 00</td><td>.00</td><td>50.</td><td>.00</td><td>0.04</td><td>101 .C</td></td<>	- 2 (FLUD	•05	• 00	.00	50.	.00	0.04	101 .C
(FLUOR)       500.0       <	- 2 (NAA)	27.	23.	18.	12.	15.	19.0	140.4
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(FLUOR)       496.       495.       488.80       11.649         (FLUOR)       546.0       569.0       548.0       574.0       543.0       556.00       14.370         (FLUOR)       546.0       548.0       574.0       543.0       556.00       14.370         (FLUOR)       560.0       548.0       574.0       543.0       556.00       14.370         (FLUOR)       560.0       548.0       574.0       550.0       14.370       551.00       14.370         (FLUOR)       551.0       590.0       560.0       560.0       543.0       51.20       1.643         (FLUOR)       450.       455.       455.       450.       551.20       1.643		m	-	6	5	18	18.0	4.582
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oratory results, means and standard deviations for thorium and total sulphur in $-3$	THORIUM
Laboratory	
- 44 -	
Table	

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Table A-4e - Laboratory results, means and standard deviations for sulphate in UTS-3

SULPHATE

.1734 .0175 .0280 .0680 .0836 .0500 .0132 .7184 .0064 MEAN -----0.165 0.009 0.05 0.013 0.662 0.082 0.06 0.03 0.005 0.02 0.035 0.035 0.035 0.035 0.031 0.031 0.013 0.165 0.01 0.183 0.012 0.012 0.03 0.03 0.04 0.03 0.06 0.06 0.06 0.06 0.014 0.014 0.174 0.022 0.03 0.08 0.086 0.056 0.007 0.012 0.697 0.035 0.180 0.03 0.07 0.082 0.013 0.782 0.03 0.021 0.007 10.0 0.04 "Outliers, not used for computations (TURBID) (CDMB) (GRAV) (GRAV) (GRAV) (TITR) (GRAV) (COMB) (GRAV) (GRAV) (GRAV) 00 -4 5 LA8-16 0 LA8-11 LA8-15 LAB-17 LA8-18 LA8-LA8-LAB-LA8-\* LAB-LAB-\*

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	22 22 22 22 22 22 22 22 22 22	0.26 0.26 0.27 0.22 0.23 0.24 0.25 0.26 0.26 0.26 0.26 0.196
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Table A-5f - Laboratory results, means and standard deviations for arsenic in UTS-4

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Laboratory	Decamposition	Separation, reagents, procedure	Finish
+	LiBO <sub>2</sub> fusion		ICP-AE
2,3b,6b	$HNO_3 + HC1O_4 + HF$		AA
3a,11	HC1 + HN03 + HC104 + HF		ICP-AE
4,5	Na <sub>2</sub> O <sub>2</sub> fusion		AA
6a	Na <sub>2</sub> 0 <sub>2</sub> -Na0H fusion	dichromate titration	Titrimetry
7.8	Na <sub>2</sub> O <sub>2</sub> or Na <sub>2</sub> O <sub>2</sub> + Na <sub>2</sub> CO <sub>3</sub> fusion		
9	$Li_2CO_3 + H_3BO_3$ fusion		ICP-AE
10	Li2B407 button fusion		Xrf

## Table A-6a - Summary of analytical methods for total iron

## Table A-6b - Summary of analytical methods for titanium

Laboratory	Decomposition	Separation, reagents, procedure	Finish
1	LiB0 <sub>2</sub> fusion		ICP-AE
2,3b	$HNO_3 + HC1O_4 + HF$		AA
3a,11	$HC1 + HNC_3 + HC1O_4 + HF$		ICP-AE
4,5	Na <sub>2</sub> 0 <sub>2</sub> fusion	Ti color developed with H <sub>2</sub> O <sub>2</sub>	Colorimetry
6	K <sub>2</sub> S <sub>2</sub> O <sub>7</sub> fusion	Ti color developed with H <sub>2</sub> C <sub>2</sub>	Colorimetry
7,8	Na <sub>2</sub> O <sub>2</sub> or Na <sub>2</sub> O <sub>2</sub> + Na <sub>2</sub> CO <sub>3</sub> fusion	£. £.	AA
9	Li <sub>2</sub> CO <sub>3</sub> + H <sub>3</sub> BO <sub>3</sub> fusion		ICP-AE
10	LiBO <sub>2</sub> button fusion		Xrf

### Table A-6c - Summary of analytical methods for aluminum

Laboratory	Decomposition	Separation, reagents, procedure	Finish
1	LiBO <sub>2</sub> fusion		ICP-AE
2,35,4.5,6	HN03 + HC104 + HF		AA
3a,11	HC1 + HN03 + HC104 + HF		ICP-AE
7,8	Na <sub>2</sub> O <sub>2</sub> or Na <sub>2</sub> O <sub>2</sub> + Na <sub>2</sub> CO <sub>3</sub> fusion		AA
9	Li <sub>2</sub> C0 <sub>3</sub> + H <sub>3</sub> BO <sub>3</sub> fusion		ICP-AE
10	LIBO <sub>2</sub> button fusion		Xrf

#### Table A-6d - Summary of analytical methods for calcium

Laboratory	• Decomposition	Separation, reagents, procedure	Finish
1	LiB0 <sub>2</sub> fusion		ICP-AE
2,35,4,5,6	HN03 + HC104 + HF		AA
3a,11	HC1 + HN03 + HC104 + HF	ICP-AE	
7	HC1 + HNO3	AA	
8	Na <sub>2</sub> O <sub>2</sub> + Na <sub>2</sub> CO <sub>3</sub> fusion		AA
9	Li2C03 + H3B03 fusion		ICP-AE
10	LiB0 <sub>2</sub> button fusion		Xrf

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Laboratory	Decomposition	Separation, reagents, procedure	Finish
1	LIBO <sub>2</sub> fusion		
4,5,18		Energy dispersive spectrometry	ICP-AE
6	Na <sub>2</sub> CO <sub>3</sub> fusion	Energy dispersive apactioniery	Xrf
6 7 8 9	LIBO <sub>2</sub> fusion		Flame emission
8	Na <sub>2</sub> O <sub>2</sub> + Na <sub>2</sub> CO <sub>3</sub> fusion		AA
9	$L_2CO_3 + H_3BO_3$ fusion		AA
10	E2003 + 113E03 (Balof)		ICP-AE
11		8:2 sample: binder pelletization	Xrf
16	$HC1 + HN0_3 + HC10_4 + HF$		ICP-AE
	HF + $H_2SO_4$ ; residue fused with $Na_2CO_3$	BaCO <sub>3</sub> precipitated; dissolved with HC1 and precipitated as BaSO <sub>4</sub> ; millipore filtration	Xrf
17	HNO <sub>3</sub> + HF + HC1	BaSO <sub>4</sub> precipitated; filtered and fused with LIBO <sub>2</sub> ; leach with HNO <sub>3</sub>	AA

## Table A-6e - Summary of analytical methods for barium

Table A-6f - Summary of analytical methods for uranium

Laboratory	Decomposition	Separation, reagents, procedure	Finian
1 2,3a,4,5,7,8	$HNO_3 + HC1O_4 + HF$		ICP-AE
9,11 25,35 6a,65,10	$HNO_3 + HCIO_4 + HF$	NaF-LIF fusion disc Delayed neutron counting Instrumental neutron activation	Flucrimetry NAA NAA

### Table A-6g - Summary of analytical methods for thorium

Laboratory	Decomposition	Separation, reagents, procedure	Finish
1.3a	$HNO_3 + HC1O_4 + HF$		ICP-AE
2,3b,12,13,14		Slowpoke reactor, measure	
		312 keV peak of <sup>233</sup> Pa	NAA
4,5		Wave-length dispersive spectro-	101 200
		metry	Xr <sup>2</sup>
6,10,11		Instrumental neutron analysis	NAA
7	Na <sub>2</sub> O <sub>2</sub> fusion	The color developed with	
		Arsenazo III	Colorimetry
8	Na <sub>2</sub> O <sub>2</sub> + Na <sub>2</sub> CO <sub>3</sub> fusion	The color developed with thoron	Colorimetry
9		Direct measurement	a-spectrometr

Laboratory	Decomposition	Separation, reagents, procedure	Finish
1,2,3,4,5 8,9,11,15, 17,18	Combustion (Leco furnace)	$\rm SO_2$ dissolved in HC1 + K1: $\rm I_2$ titrated with KIO_3	Combustion- fitrimetry
6,16	HNC <sub>3</sub> + Br <sub>2</sub> ; Na <sub>2</sub> O <sub>2</sub> fusion of insolucies	BaSO <sub>4</sub> precipitation	Gravimetry
7	Na <sub>2</sub> CO <sub>2</sub> + KNO <sub>3</sub> fusion	BaS0 <sub>4</sub> precipitation	Gravimetry
10	2 2 3	8:2 sample: binder pellet	
16	HC1 + HNC3 + Br2	Crickidation Fei reduced with H <sub>2</sub> NOH.HC1	Xrf
		BaSO <sub>4</sub> precipitated	Gravimetry

### Table A-6h - Summary of analytical methods for total sulphur

	Table A-6i – Summary	of anal	vtical methods	for sulphate
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Laboratory	Decomposition	Separation, reagents, procedure	Finish Gravimetry	
1,9,10,11, 15,16	Boiled with 10% HC1 for 1 h	BaS0 <sub>4</sub> precipitation		
2,3	Surphide minerals decomposed with HI + HgC1 <sub>2</sub>	H <sub>2</sub> S absorbed as CcS; oxidized with excess I <sub>2</sub> ; remaining I <sub>2</sub> titrated with Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ; sulphate is total sulphur — sulphide sulphur	Combustion-	
4,5	Sulphide minerals decomposed with H <sub>3</sub> PO <sub>4</sub> + Sn	Residual sulphur by combustion (Lecolfurnace)	Combustion- titrimetry	
6	Hot water leach	BaSO <sub>4</sub> precipitation	Gravimetry	
6 7	Sulphide minerals decomposed with HC1; residue fused with			
	Na <sub>2</sub> CO <sub>3</sub> + KNO <sub>3</sub>	BaSO <sub>4</sub> precipitation	Gravimetry	
15,17,18	Bailed with 10% HC1 for 1 h; suiphur in residue determined by Leco-furnace-iodiametry	Sulphate in total sulphur minus sulphur after HC1 leach	Combustion- Strimetry	
16	Bolled with 10% HC1 for 1 h	Dissolved sulphate precipitated as BaSO <sub>4</sub>	Gravimetry for UTS-1 to UTS-3 Turbid metry to UTS-4	

### Table A-6j - Summary of analytical methods for nickel

Laboratory	Decomposition	Separation, reagents, procedure	
1,3a,11	HN03 + HC104 + HF		ICP-AE
2,3b,4.5	$HNO_3 + HC1O_4 + HF$		AA
6,7,9.10			
8	$Na_2O_2 + Na_2CO_3$ fusion		AA

Laboratory	Decomposition	Separation, reagents, procedure	Finish	
1	$HNO_3 + HC1O_4 + HF$		ICP-AE	
2,3	K <sub>2</sub> S <sub>2</sub> O <sub>7</sub> fusion	Arsine vapor evolution	AA	
4,5,8	HN03 + HC104 + HF	Arsine vapor absorbed in silver	. (A	
		dithiocarbamate-pyridine	Colorimetry	
6,10		Instrumental neutron activation	NAA	
7	$HNO_3 + HC1O_4 + HF$	Molyboarsenate separation by		
		extraction into chloroform-		
		butanol and stripping into		
		aqueous phase	Colorimetry	
9 11	HC1 + HNO <sub>3</sub>	Arsine vapor evolution	AA	
11	$HN0_3 + HC10_4$	Arsine vapor evolution	AA	

#### Table A-6k - Summary of analytical methods for arsenic

Table A-7a - Consensus values and related statistical parameters for UTS-1

	No. of sets	Total No. ( of results	Consensus	95%		
Constituent	of results		value	Low	High	۶Ą
Fe(total)	12	60	4.87%	4.81	4,94	0.05
Ti	10	50	0.54%	0.51	0.57	0.01
AL	12	60	6.24%	6.15	6.33	0.06
Ca	11	55	5.24%	5.17	5.31	0.04
S(total)	10	50	1.00%	0.94	1.05	0.03
Sulphate	9	45	2.64%	2.58	2.71	0.04
Ba	11	55	324 µg/g	288	360	13
U	12	60	49 µg/g	44	54	а
Th	11	55	138 µg/g	130	147	6

Table A-7b - Consensus values and related statistical parameters for UTS-2

	No. of sets		Consensus	95% CL		
Constituen:	of results		value	Low	High	σд
Fe(total)	12	60	3.20%	3.09	3.30	0.04
Ti	12	60	0.18%	0.16	0.21	0.01
Al	12	59	2.71%	2.65	2.76	0.04
Ca	12	60	0.42%	0.39	0.44	0.01
S(total)	11	55	3.23%	3.13	3.33	0.05
Sulphate	10	50	0.84%	0.76	0.92	0.01
Ba	11	55	464 μg/g	425	504	12
U	10	50	56 µg/g	55	67	2
Th	12	60	174 µg/g	162	187	6

	No. of sets	Tota! No.	Cansensus	95% CL		
Constituent	of results	of results	value	Low	High	σA
Fe(tota/)	12	60	3.25%	3.19	3.31	0.04
TI	11	55	0.23%	0.21	0.24	0.007
Al	12	60	5.80%	5.66	5.94	0.04
Ca	10	50	4.03%	3.96	4.10	0.04
S(total)	10	50	0.23%	0.21	0.24	0.01
Sulphate	9	44	0.04%	0.01	0.06	0.005
Ba	11	55	212 µg/g	192	232	8
U.	13	65	513 µg/g	497	529	a
Τn	15	55	10.0 µg/g	8.6	11.4	1.4

Table A-7c - Consensus values and related statistical parameters for UTS-3

Table A-7d - Consensus values and related statistical parameters for UTS-4

-	No, of sets	Total No. Consensus of results value	Consensus	95		
Constituent	of results		value	Low	High	σд
Fe(total)	11	54	2.62%	2.57	2.67	0.03
Ti	12	60	0.24%	0.22	0.26	0.008
Al	11	55	6.29%	6.20	6.38	0.05
Ca	11	55	1.75%	1.69	1.51	0.02
S(total)	13	65	1.80%	1.76	1.84	0.04
Sulphate	9	44	5.21%	5.15	5.28	0.04
Ba	12	60	65 µg/g	50	80	10
U	14	69	1010 µg/g	984	1036	1.9
Th	12	59	15.4 µg/g	13.2	17.5	1.0
Ni	12	60	151 µg/g	125	176	5
As	10	50	38 µg/g	36	40	ž

Table	A-8	-	Approximate	chemical	composition
			values		

	UTS-1	UTS-2	UTS-3	UTS-4
Constituent				
SIO <sub>2</sub>	61.9	<b>84.0</b>	65.4	57.8
Na <sub>2</sub> Õ	5.0	0.1	5.1	0.2
K <sub>2</sub> O	2.0	2.0	0.3	0.4