OAK RIDGE
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ORNL/TM-2009/305

Data Compilation for AGR-2 UCO Baseline Compact Lot LEU07-OP1-Z

Revision 0

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December 2009

Prepared for the
United States Department of Energy -
Office of Nuclear Energy
under the
Next Generation Nuclear Plant -
Advanced Gas Reactor Fuel Development Program

UT-BATTELLE
ORNL-27 (4-00)

Data Compilation for AGR-2 UCO Baseline Compact Lot LEU07-OP1-Z

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This document is a compilation of characterization data for the candidate AGR-2 UCO Baseline fuel compact lot LEU07-OP1-Z. The compacts were produced by ORNL for the Advanced Gas Reactor Fuel Development and Qualification (AGR) program for the second AGR irradiation test (AGR-2). This compact lot was fabricated using particle composite LEU07. LEU07 came from Babcock and Wilcox (B&W) coated particle lot G73J-14-93072A, which was an upgraded batch of TRISO-coated 425 μm diameter, 14% low enrichment uranium oxide/uranium carbide kernels (LEUCO). The AGR-2 TRISO-coated particles consist of a spherical kernel coated with an ~50% dense carbon buffer layer (100 μm nominal thickness), followed by a dense inner pyrocarbon layer (40 μm nominal thickness), followed by a SiC layer (35 μm nominal thickness), followed by another dense outer pyrocarbon layer (40 μm nominal thickness). The kernels were also manufactured by B&W and identified as kernel lot G73I-14-69307. Two data packages were submitted by B&W containing the acceptance testing results for the kernels and coated particles, these are identified by their lot numbers. A discussion on the coating of the B&W TRISO particles can also be found in INL report INL/EXT-09-16545. A data compilation of ORNL analysis of G73J-14-93072A can be found in ORNL/TM-2008/133.

The AGR-2 Fuel Specification (INL SPC-923) provides the requirements necessary for acceptance of the fuel manufactured for the AGR-2 irradiation test. Section 3.3 of SPC-923 provides the property requirements for the heat treated compacts. The Statistical Sampling Plan for AGR-2 Fuel Materials (INL PLN-2691) provides additional guidance regarding statistical methods for product acceptance and recommended sample sizes. The procedures for characterizing and qualifying the compacts are outlined in ORNL product inspection plan AGR-CHAR-PIP-12. The inspection report forms generated by this product inspection plan document the product acceptance for the property requirements listed in section 3.3 of SPC-923. Prior to compacting, the overcoated particles are characterized per ORNL product inspection plan AGR-CHAR-PIP-11 to obtain data needed for calculation of compacting charge weight and matrix density. Riffling of compact charges is also covered by this procedure. Prior to overcoating, the TRISO particles are characterized per ORNL product inspection plan AGR-CHAR-PIP-10 to determine uranium content, obtain data needed for overcoating and compact fabrication, and obtain further data needed for calculation of matrix density. Riffling of overcoater charges is also covered by this procedure. This document contains all the inspection report forms and data report forms generated by these inspection plans.

In addition to the characterization data, this report also contains other records relevant to the fuel product acceptance. A history of the material flow and sample naming is included. The overcoating and compacting process is summarized. A record of the materials used to make the matrix is also included. A Certificate of Conformance and any applicable Nonconformance Reports are attached as Appendices.

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1 Material identification record for LEU07-OP1-Z compacts

Table 1-1 lists the materials used to make the LEU07-OP1-Z compacts, including intermediate batches and samples used for characterization. TRISO-coated particles were shipped from B&W to ORNL on December 22, 2008. Twenty four completed compacts were shipped to INL on June 24, 2009. Twenty four compacts were retained at ORNL and 107 compacts were consumed at ORNL by the QC acceptance testing. Table 1-2 lists the disposition of each compact.

Table 1-1: Material identification record for LEU07-OP1-Z compacts

Sample ID	Parent material	Notes
G73I-14-69307	G73I-14-59370 G73I-14-59371 G73I-14-59372 G73I-14-59373 G73I-14-59375	B&W kernel composite from 5 batches
G73J-14-93072A	G73I-14-69307	B&W TRISO-coated particles
NP-B8220 NP-B8221 NP-B8222 NP-B8223	G73J-14-93072A	983 g sample from 93072A shipped to ORNL on 12/22/2008
LEU07	NP-B8220 NP-B8221 NP-B8222 NP-B8223	TRISO-coated particles re-composited after methanol wash
LEU07-A01	LEU07	TRISO-coated particle QC archive
LEU07-B01 LEU07-C01 LEU07-D01 LEU07-E01 LEU07-F01 LEU07-G01	LEU07	TRISO-coated particle characterization samples
LEU07-Y##	LEU07	Charges for overcoating, numbered Y01 through Y48
RD13371	Asbury Graphite Mills	Natural graphite
KRB2000	SGL Carbon	Synthetic graphite
SC1008	Hexion	Durite resin lot LK8JD0450
RDKrS-011309 RDKrS-012009 RDKrS-022009 RDKrS-021309	64 wt% RD13371 16 wt% KRB2000 20 wt% SC1008	Matrix precursor batches
LEU07-OP1	LEU07-Y01 to LEU07-Y17 + RDKrS-011309 LEU07-Y18 to LEU07-Y25 + RDKrS-012009 LEU07-Y27, Y29, Y31 + RDKrS-012009 LEU07-Y26, Y28, Y30 + RDKrS-022009 LEU07-Y32 to LEU07-Y44 + RDKrS-022009 LEU07-Y45 to LEU07-Y48 + RDKrS-021309	Over-coated particle composite
LEU07-OP1-A01	LEU07-OP1	Overcoated particle QC archive
LEU07-OP1-B01 LEU07-OP1-C01	LEU07-OP1	Overcoated particle characterization samples
LEU07-OP1-G###	LEU07-OP1	Compacts, numbered G001 through G180
LEU07-OP1-Z###	LEU07-OP1-G###	Compacts, numbered Z001 through Z155 One to one correspondence to G### recorded on DRF24C (section 7)

Table 1-2: Disposition of LEU07-OP1-Z compacts

Sent to INL	Retained at ORNL	Consumed during QC analysis		
LEU07-OP1-Z003	LEU07-OP1-Z008	LEU07-OP1-Z001	LEU07-OP1-Z051	LEU07-OP1-Z107
LEU07-OP1-Z004	LEU07-OP1-Z015	LEU07-OP1-Z002	LEU07-OP1-Z052	LEU07-OP1-Z108
LEU07-OP1-Z007	LEU07-OP1-Z016	LEU07-OP1-Z005	LEU07-OP1-Z053	LEU07-OP1-Z110
LEU07-OP1-Z012	LEU07-OP1-Z036	LEU07-OP1-Z006	LEU07-OP1-Z055	LEU07-OP1-Z111
LEU07-OP1-Z014	LEU07-OP1-Z054	LEU07-OP1-Z009	LEU07-OP1-Z056	LEU07-OP1-Z112
LEU07-OP1-Z019	LEU07-OP1-Z063	LEU07-OP1-Z010	LEU07-OP1-Z057	LEU07-OP1-Z114
LEU07-OP1-Z020	LEU07-OP1-Z065	LEU07-OP1-Z011	LEU07-OP1-Z058	LEU07-OP1-Z115
LEU07-OP1-Z021	LEU07-OP1-Z067	LEU07-OP1-Z013	LEU07-OP1-Z059	LEU07-OP1-Z119
LEU07-OP1-Z041	LEU07-OP1-Z071	LEU07-OP1-Z017	LEU07-OP1-Z060	LEU07-OP1-Z120
LEU07-OP1-Z043	LEU07-OP1-Z073	LEU07-OP1-Z018	LEU07-OP1-Z061	LEU07-OP1-Z122
LEU07-OP1-Z068	LEU07-OP1-Z084	LEU07-OP1-Z022	LEU07-OP1-Z062	LEU07-OP1-Z123
LEU07-OP1-Z072	LEU07-OP1-Z089	LEU07-OP1-Z023	LEU07-OP1-Z064	LEU07-OP1-Z124
LEU07-OP1-Z074	LEU07-OP1-Z098	LEU07-OP1-Z024	LEU07-OP1-Z066	LEU07-OP1-Z125
LEU07-OP1-Z080	LEU07-OP1-Z102	LEU07-OP1-Z025	LEU07-OP1-Z069	LEU07-OP1-Z127
LEU07-OP1-Z081	LEU07-OP1-Z109	LEU07-OP1-Z026	LEU07-OP1-Z070	LEU07-OP1-Z129
LEU07-OP1-Z082	LEU07-OP1-Z113	LEU07-OP1-Z027	LEU07-OP1-Z075	LEU07-OP1-Z130
LEU07-OP1-Z093	LEU07-OP1-Z116	LEU07-OP1-Z028	LEU07-OP1-Z076	LEU07-OP1-Z133
LEU07-OP1-Z094	LEU07-OP1-Z126	LEU07-OP1-Z029	LEU07-OP1-Z077	LEU07-OP1-Z134
LEU07-OP1-Z105	LEU07-OP1-Z131	LEU07-OP1-Z030	LEU07-OP1-Z078	LEU07-OP1-Z135
LEU07-OP1-Z106	LEU07-OP1-Z132	LEU07-OP1-Z031	LEU07-OP1-Z079	LEU07-OP1-Z136
LEU07-OP1-Z117	LEU07-OP1-Z137	LEU07-OP1-Z032	LEU07-OP1-Z083	LEU07-OP1-Z138
LEU07-OP1-Z118	LEU07-OP1-Z143	LEU07-OP1-Z033	LEU07-OP1-Z085	LEU07-OP1-Z139
LEU07-OP1-Z121	LEU07-OP1-Z148	LEU07-OP1-Z034	LEU07-OP1-Z086	LEU07-OP1-Z140
LEU07-OP1-Z128	LEU07-OP1-Z151	LEU07-OP1-Z035	LEU07-OP1-Z087	LEU07-OP1-Z141
		LEU07-OP1-Z037	LEU07-OP1-Z088	LEU07-OP1-Z142
		LEU07-OP1-Z038	LEU07-OP1-Z090	LEU07-OP1-Z144
		LEU07-OP1-Z039	LEU07-OP1-Z091	LEU07-OP1-Z145
		LEU07-OP1-Z040	LEU07-OP1-Z092	LEU07-OP1-Z146
		LEU07-OP1-Z042	LEU07-OP1-Z095	LEU07-OP1-Z147
		LEU07-OP1-Z044	LEU07-OP1-Z096	LEU07-OP1-Z149
		LEU07-OP1-Z045	LEU07-OP1-Z097	LEU07-OP1-Z150
		LEU07-OP1-Z046	LEU07-OP1-Z099	LEU07-OP1-Z152
		LEU07-OP1-Z047	LEU07-OP1-Z100	LEU07-OP1-Z153
		LEU07-OP1-Z048	LEU07-OP1-Z101	LEU07-OP1-Z154
		LEU07-OP1-Z049	LEU07-OP1-Z103	LEU07-OP1-Z155
		LEU07-OP1-Z050	LEU07-OP1-Z104	

2 Summary of acceptance test results for LEU07-OP1-Z

At the end of this section is the inspection report form IRF-12A associated with the compact lot LEU06-OP1-Z. This inspection report form also appears in section 7 of this compilation, accompanied by the associated data report forms (DRFs) showing the results of each individual measurement. The inspection report form summarizes the acceptance testing performed according to the product inspection plan AGR-CHAR-PIP-12. The information in this form covers all the property specifications listed in section 3.3 of the AGR-2 Fuel Specification (INL SPC-923, Rev. 3). The compact lot, LEU07-OP1-Z, did not meet all the requirements in section 3.3 of SPC-923, Rev. 3. A nonconformance related to compact length was determined to be acceptable. However, a higher than allowed fraction of exposed uranium was determined to not be acceptable for the AGR-2 irradiation test. The exposed uranium was due to cracked TRISO layers in the coated particle composite. These cracks are thought to have occurred when particles were removed from the coating furnace using a suction device. In addition, a higher than allowed IPyC defect fraction was determined to not be acceptable for the AGR-2 irradiation test. Excessive permeability of chlorine through the IPyC during SiC deposition was evident from x-ray observation of uranium dispersion out of the kernel and into the buffer after particles experienced 1800°C heat treatment in the final stage of compacting. The final disposition of this compact lot was to not use the compacts for the AGR-2 irradiation test, but to retain the compacts in storage at ORNL and INL for possible future analysis or methods development. This disposition was documented on INL NCR-44791 and INL NCR-44792.

Table 2-1 is provided for quick reference. It gives the mean values of key variable properties of the compact lot, LEU07-OP1-Z. For standard deviations of the distribution of the measured values see the appropriate IRF or DRF. For discussions on the uncertainty in these values, see the associated data acquisition methods and data report forms.

Table 2-1: Quick reference table for key variable properties of LEU07-OP1-Z.

Property	Mean
Mean uranium loading (g U/compact)	1.251
Compact diameter (mm)	12.32
Compact length (mm)	25.19
Compact mass (g)	6.346
Compact matrix density (g/cm^3)	1.61
Impurity content	

The reported mean impurity levels for the fuel compacts, recorded on IRF-12A and IRF-12B, may be higher than the actual values. This is because the as-reported mean impurity levels do not reflect the fact that some of the measurements were at or below the mass spectrometry measurement threshold, and thus could not be differentiated from zero. For the purpose of the acceptance test, impurity values reported as threshold values (documented in the data report forms with the < symbol) are always assumed to be equal to the maximum possible value. In addition, each time a leach was performed, a blank run was also performed, where all the relevant wet chemistry steps in the leach-burn-leach procedure in AGR-CHAR-DAM-26R1 were

performed without a compact present, in order to obtain background values for each analyzed impurity. If a measurable impurity value was obtained in the blank, then that value was subtracted from the measured value in each sample. However, if a threshold value was reported in the blank, then no background subtraction was performed. Table 2-2 shows the possible range for the measured impurities, where the upper limit is the as-reported mean and the lower limit is the possible minimum value calculated by accounting for the fact that values reported as threshold values could have been as low as zero. This range reflects the uncertainty in the measured impurity values due to the mass spectrometry measurement thresholds.

Table 2-2: Mean impurity levels for fuel compacts from LEU07-OP1-Z compact lot measured by deconsolidation leach-burn-leach technique.

Impurity	Measured impurity content (μg/compact)
Iron	0.70 - 4.78
Chromium	0.37 - 0.59
Manganese	0.00 - 0.20
Cobalt	0.00 - 0.16
Nickel	0.02 - 0.84
Calcium	30.35 - 36.05
Aluminum	30.01 - 30.08
Titanium	2.17 - 3.05
Vanadium	18.01 - 18.23

Table 2-3 is also provided for quick reference. It gives the upper limit of the 95% confidence interval of the defect fraction for key attribute properties of the compact lot LEU07-OP1-Z. In other words, these values are the lowest tolerance limits for which the compact lot would be deemed acceptable at 95% confidence, based on the particular sample that was measured. Also listed in the table are the actual number of defects observed and the number of particles analyzed. Note that in the case of all but the uranium contamination fraction, zero defects were observed. The defect fractions listed in the table for these cases are limited by the number of particles measured and the actual defect fraction could be much lower.

Table 2-3: Quick reference table for key attribute properties of LEU07-OP1-Z.

Property	Observed Number of Defects/ Number of Particles Analyzed	95% Confidence Defect Fraction
Uranium contamination fraction	15/317690	≤7.3E-5
Defective SiC coating fraction	0/190614	≤1.6E-5
Defective IPyC coating fraction	443/63538	≤7.6E-3
Defective OPyC coating fraction	0/3177	≤9.5E-4

It is also interesting to note the increase in pyrocarbon anisotropy due to compact heat treatment. The diattenuation of the IPyC increased from 0.0118±0.0006 to 0.0150±0.0006 (1.0355±0.0019 to 1.0451±0.0019 in terms of effective BAFo). The diattenuation of the OPyC increased from 0.0081±0.0003 to 0.0129±0.0007 (1.0242±0.0008 to 1.0388±0.0021 in terms of effective BAFo).

Inspection Report Form IRF-12A: AGR-2 UCO Fuel Compact Lots

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers of compacts not consumed by acceptance testing:	003 004 007 008 012 014 015 016 019 020 021 036 041 043 054 063 065 067 068 071 072 073 074 080 081 082 084 089 093 094 098 102 105 106 109 113 116 117 118 121 126 128 131 132 137 143 148 151

Property	Measured Data: Mean (x)	Std. Dev. (s)	Measurements (n)	k or t value	Specification: INL SPC-923 Revison 3	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
Uranium loading (gU/compact)	1.251	0.005	6	2.015	1.265 ± 0.07	A = x - ts/√n ≥ 1.195	1.247	pass	DRF-25
						B = x + ts/√n ≤ 1.335	1.255	pass	
Compact diameter (mm)	See DRF-24				12.22 - 12.46	All available for irradiation test meet specification	See DRF-24	fail	DRF-24
Compact length (mm)					25.02 - 25.40				
Compact matrix density (g/cm^3)					≥1.45			pass	
Iron content outside SiC (µg/compact)	4.78	2.17	12	1.796	mean ≤ 25	B = x + ts/√n ≤ 25	5.9	pass	IRF-12B DRF-26
				3.747	dispersion ≤0.01 ≥ 100	D = x + √3ks < 100	18.9	pass	
Chromium content outside SiC (µg/compact)	0.59	0.06	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	0.6	pass	IRF-12B DRF-26
Manganese content outside SiC (µg/compact)	0.20	0.09	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	0.2	pass	IRF-12B DRF-26
Cobalt content outside SiC (µg/compact)	0.16	0.07	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	0.2	pass	IRF-12B DRF-26
Nickel content outside SiC (µg/compact)	0.84	0.36	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	1.0	pass	IRF-12B DRF-26
Cr + Mn + Co + Ni content outside SiC (µg/compact)	1.78	0.50	12	3.747	dispersion ≤0.01 ≥ 200	D = x + √3ks < 200	5.0	pass	IRF-12B DRF-26
Calcium content outside SiC (µg/compact)	36.05	6.22	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	39.3	pass	IRF-12B DRF-26
Aluminum content outside SiC (µg/compact)	30.08	9.54	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	35.0	pass	IRF-12B DRF-26
Ti + V content outside SiC (µg/compact)	21.28	1.04	12	1.796	mean ≤ 240	B = x + ts/√n ≤ 240	21.8	pass	IRF-12B DRF-26

Property	Measured Data: # of compacts	# of particles	Specification: INL SPC-923 Revison 2	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
Uranium contamination fraction (g exposed U/gram U in compact)	100	317690	≤ 2.0 x 10^{-5}	≤1 effectively exposed kernel in ≥237192 particles or ≤2 effectively exposed kernels in ≥314788 particles	14.6	fail	IRF-12C DRF-26
Defective SiC coating fraction (fraction of total particles)	60	190614	≤ 1.0 x 10^{-4}	≤2 leached kernels in ≥62956 particles or ≤6 leached kernels in ≥118422 particles	0	pass	IRF-12D DRF-26
Defective IPyC coating fraction (fraction of total particles)	20	63538	≤ 1.0 x 10^{-4}	≤1 with excessive U dispersion in ≥47437 particles or ≤2 with excessive U dispersion in ≥62956 particles	443	fail	DRF-28
Defective OPyC coating fraction (fraction of total particles)	1	3177	≤ 0.01	≤6 cracked or missing OPyC in ≥1182 particles	0	pass	DRF-27

Comments

One compact was outside of the length specification by +0.046 mm. This non-conformance was documented on ORNL NCR-X-MSTD-AGR-10-01 with a disposition of use as is.
A 15/317690 uranium contamination fraction is above the specified limit and corresponds to <7.3e-5 at 95% confidence. This non-conformance was documented on INL NCR-44791 with a disposition of do not use for AGR-2 irradiation test, but retain for other uses.
A 443/63538 defective IPyC coating fraction is above the specified limit and corresponds to <7.6e-3 at 95% confidence. This non-conformance was documented on INL NCR-44792 with a disposition of do not use for AGR-2 irradiation test, but retain for other uses.

QC Supervisor	Date: 12-17-09

Accept compact lot (Yes or No):	**No**

QA Reviewer	Date: 12/17/09

3 Compacting process conditions

Four samples totaling 983 g were riffled from coated particle batch G73J-14-93072A using a chute splitter, and shipped from B&W on December 22, 2008. After receipt, the particles were washed in methanol per procedure AGR-TRISOWASH-SOP-1, "Standard Operating Procedure for TRISO Particle Washing." Washing of particles prior to overcoating was adapted in order to help reduce the amount of contamination on the particles that may have been acquired during processing or general handling. This procedure also reduces the amount of loose carbon dust on the surface of the particles. The washing procedure was adopted from General Atomics' particle washing procedures.

After washing, particles were combined and homogenized and renamed LEU07 and AGR-CHAR-PIP-10, Rev. 2, "Product Inspection Plan for AGR-2 Particles for Compacting - Preliminary Measurements" was completed. This plan calls for measurement of average particle weight, diameter, envelope volume, and uranium content. The plan also calls for riffling of 20 gram aliquots for use as overcoater charges. Riffling at ORNL was done using a 10 position rotary riffler. After riffling out the characterization samples, forty-eight overcoater charges were prepared and labeled LEU07-Y01 through Y48. The results of the PIP-10 inspection are reported in section 5. Additional ORNL characterization performed on another sample taken from G73J-14-93072A is provided in ORNL/TM-2008/133, "Data Compilation for AGR-2 UCO Baseline Coated Particle Batch G73J-14-93072A".

One ~20g aliquot was used per overcoating run. Overcoating was performed according to AGR-COMP-SOP-2, Rev. 1, "Standard Operating Procedure for Overcoating TRISO Particles." The LEU07-Y## riffled aliquots were overcoated with the following matrix batches: Y01-Y17 (RDKrS 011309), Y18-Y25, Y27, Y29, Y31 (RDKrS 012009), Y26, Y28, Y30, Y32-Y44 (RDKrS 022009), and Y45-Y48 (RDKrS 021309).

In total, 1396 grams of -12/+16 overcoated particles were produced by overcoating TRISO aliquots Y01-Y48. "-12/+16" overcoated particles are those that pass through an ASTM E11 No. 12 sieve (1.70 mm nominal opening) but do not pass through an ASTM E11 No. 16 sieve (1.18 mm nominal opening). The 1396 grams of sieved overcoated particles was tabled and 1214 grams of Bin 3 particles were recovered. "Bin 3" particles are those particles that end up in the third bin of a shape separation inclined table; these are the most spherical overcoated particles. 1214 grams of Bin 3 overcoated particles was determined to be a sufficient quantity to produce at least 180 compacts, based on preliminary calculations. The total number of compacts required for acceptance testing, irradiation, and spares was 155.

After overcoating, the overcoated particles from Y01-Y48 were combined and homogenized into an overcoated particle composite. The overcoated particle composite was labeled LEU07-OP1 and AGR-CHAR-PIP-11, Rev. 0, "Product Inspection Plan for AGR-2 Overcoated Particles for Compacting" was completed. This plan calls for measurement of average overcoated particle weight and diameter. The results of the PIP-11 inspection are reported in section 7. The plan also calls for riffling of compact charges for pressing.

Based on the average uranium loading determined for the LEU07 particles of $3.930 \cdot 10^{-4}$ g (section 5), 3219 particles would be needed in each compact to obtain an average uranium loading of 1.265 g for the compacts (the specified loading in SPC-923 was 1.265 ± 0.07 g). However, for consistency with the LEU06-OP1-Z compact lot (see LEU06-OP1-Z compacts data package ORNL/TM-2009/304) a target of 3200 particles per compact was chosen. This compact charge was based on the measured average uranium loading for LEU06 particles of $3.953 \cdot 10^{-4}$ g. Note that both of these particle batches used the same kernel charge so the uranium loading was expected to be the same. The average LEU07-OP1 overcoated particle weight was measured to be $2.018 \cdot 10^{-3}$ g (section 6). Using this value, a compact charge of 6.458 g was calculated in order to achieve a compact with a uranium loading of 1.265 ± 0.07 g. One hundred and eighty compact charges were prepared and labeled LEU07-OP1-G001 through G180. A record of the weight of each compact charge can be found on data report form DRF-24D, in section 7.

Actual compact uranium loading was measured to be 1.251 ± 0.005 g. Twenty compacts were deconsolidated and the particles were counted as part of the x-ray analysis for possible uranium dispersion due to defective IPyC. The average number of particles per compact was determined to be 3177, 23 particles short of the target compact loading. This reduced number of particles per compact explains the slightly low uranium loading result. It is hypothesized that the reason for the undershoot in particles per compact was due to weight loss from the overcoated particles from evaporation of methanol and volatiles from the resin. Overcoated particles were kept in sealed containers as much as feasible during riffling of the compact charges. However, it is likely that the weight loss due to evaporation for the samples used to determine average particle weight was greater than for the overcoated particles weighed out into each compact charge. Therefore, the average overcoated particle weight used to calculate the target compact charge was slightly too low.

Note that all the uranium per particle measurements on the LEU06 and LEU07 material were consistent to within the sampling error and measurement uncertainty, as expected given that the same kernel batch was used for both coating runs. Table 3-1 shows the measured average uranium content in the particles from the uranium analyses performed directly on the particles compared to that calculated from the analyses performed on the compacts divided by the average number of particles per compact.

Table 3-1: Average and standard deviation (± value) of four independent measurements of uranium per particle for LEU06 and LEU07 particles.

	LEU06	LEU07
grams U/particle based on particle analysis	$3.953 \pm 0.010 \cdot 10^{-4}$ g	$3.930 \pm 0.007 \cdot 10^{-4}$ g
grams U/particle based on compact analysis	$3.942 \pm 0.006 \cdot 10^{-4}$ g	$3.938 \pm 0.016 \cdot 10^{-4}$ g

The LEU07-OP1-G## compacting charges were formed into green compacts using a heated, double acting die and a Carver hydraulic press. Compacting was performed in accordance with AGR-COMP-SOP-3, Rev. 1, "Standard Operating Procedure for Compacting". The die was heated to 70°C and approximately 0.10 g of matrix was added to the top and bottom of the compact in order to create matrix “end caps.” The end caps were formed with the compact by

first pouring a matrix charge into the heated die, followed by the overcoated particles, and then a second charge of matrix. This forming method created a thin (less than 0.5 mm thick) fuel free zone on the ends of the compact, called end caps. In total, 180 green compacts were fabricated. The compacts retained the designation of the riffled charges, LEU07-OP1-G001 through G180. All 180 green compacts were carbonized and heat treated according to AGR-COMP-SOP-4, Rev. 0, "Standard Operating Procedure for Carbonizing Compacts," and AGR-COMP-SOP-5 Rev. 1, "Standard Operating Procedure for Heat-treating Compacts."

Prior to compacting the LEU07-OP1-G### charges, test compacts were made using excess material from the Bin 2 overcoated particles that were accumulated after tabling. Bin 2 overcoated particles are spherical in nature, but not as spherical as the Bin 3 overcoated particles that were retained for the LEU07-OP1 composite. LEU07 Bin 2 overcoated particles were compacted in an effort to determine the optimal pressing temperature needed to avoid end cap fissures. End cap fissures were found in some of the LEU06 compacts and were evidenced by what appeared to be a thin surface crack where the end caps met the overcoated particles. The end cap fissures appeared to be caused by adhesion of the end caps to the pressing rams at the elevated temperatures used for LEU06-OP1-Z compacting. AGR-1 compacts were made at room temperature with a higher methanol content in the overcoat in order to reduce the compacting pressure. The AGR-2 compact fabrication process replaced the high methanol content with the use of an elevated compacting temperature to help the overcoat to flow easier. Compacting at elevated temperature was more in line with the current AGR program plans for future compact scale-up, which may use elevated temperature instead of methanol to enhance resin flow and which may involve temperatures as high as 140°C, depending on the type of resin used. Note that the end cap fissure defect didn't appear during earlier AGR-2 compacting development efforts because the defect fraction was too low to observe until a large number of compacts were processed under identical conditions. Minor modifications to the compacting process parameters were explored in order to eliminate the presence of end cap fissures. In total, 28 LEU07 Bin 2 test compacts were made at pressing temperatures ranging from 45 to 95°C. It was found that no fissures were observed at lower temperatures, but that greater than 700 lbs-f (3100 N) pressing forces were needed to achieve target packing fractions and matrix densities. The optimal pressing temperature and subsequent force was found to be a pressing temperature of 70°C, which required a force of ~560 lbs-f (~2500 N). This was a lower temperature and higher pressure than used for LEU06-OP1-Z compacts (94.5°C, ~2000 N).

After compacting, 155 compacts were selected from LEU07-OP1-G001 through G180 for use. Compacts with obvious processing defects, chips, or undesirable dimensions were sorted out and not included in the 155 compacts selected for the final fuel compact lot. This down-select was part of the compacting process and was performed prior to random selection of compacts for acceptance testing. It should be understood that the results in this section and the acceptance testing are only relevant for the final 155 compact lot from which random representative samples were drawn for characterization. As instructed in AGR-CHAR-PIP-12, Rev. 1, "Product Inspection Plan for AGR-2 UCO Fuel Compact Lots", these 155 compacts were randomized and relabeled as LEU07-OP1-Z001 through Z155. A record of the original G-number for each Z-numbered compact can be found on data report form DRF-24C, in section 7. After relabeling, the compacts were characterized for product acceptance according to product inspection plan PIP-12. This plan calls for measurement of compact length, diameter, mass, matrix density, uranium

content, impurity content, and determination of defect fractions for exposed uranium, defective SiC, uranium dispersion due to defective IPyC, and defective OPyC.

AGR-2 Process Conditions

The LEU07-OP1-Z (AGR-2 UCO Baseline) compact lot was made in accordance with the AGR-2 Fuel Specification (SPC-923, Rev. 3). The specified AGR-2 process limits are listed below.

Molding Pressure:	< 60 MPa
Carbonization parameters:	< 350ºC/hr in He atmosphere Hold at 950 ± 50ºC for 1.0 ± 0.4 hr Furnace cool
Heat treatment parameters:	~20ºC/min in vacuum (<1.3 Pa) Hold at 1650-1850ºC for 60 ± 10 min Furnace cool at ~20ºC/min to below 700ºC

Table 3-2 shows the process conditions used in molding the compacts, carbonizing the compacts, and heat treating the compacts. In the carbonization regime, the furnace was allowed to cool under no power (i.e., after holding at 950°C for 1 hour, power was turned off). In the heat treatment run, the furnace was cooled under power at 20°C/min until the furnace temperature reached 700°C, and then the furnace was allowed to cool under no power.

Table 3-2: Summary of process conditions used in making LEU07-OP1-Z (AGR-2 UCO Baseline) compacts

Compact ID	Carbonization Parameter					Heat-treatment Parameters			
	Molding Pressure (MPa)	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere
LEU07-OP1-Z001	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z002	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z003	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z004	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z005	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z006	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z007	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z008	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z009	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z010	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z011	21.7	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z012	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z013	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z014	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z015	21.7	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z016	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z017	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z018	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z019	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z020	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z021	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z022	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z023	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z024	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z025	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z026	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z027	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z028	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z029	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z030	20.9	4.7	950	1	flowing He	20	1800	1	vacuum

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Table 3-2 (cont.): Summary of process conditions used in making LEU07-OP1-Z (AGR-2 UCO Baseline) compacts

Compact ID	Carbonization Parameter					Heat-treatment Parameters			
	Molding Pressure (MPa)	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere
LEU07-OP1-Z031	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z032	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z033	21.7	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z034	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z035	22.4	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z036	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z037	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z038	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z039	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z040	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z041	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z042	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z043	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z044	21.7	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z045	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z046	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z047	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z048	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z049	21.7	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z050	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z051	22.4	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z052	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z053	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z054	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z055	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z056	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z057	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z058	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z059	21.7	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z060	20.9	4.7	950	1	flowing He	20	1800	1	vacuum

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Table 3-2 (cont.): Summary of process conditions used in making LEU07-OP1-Z (AGR-2 UCO Baseline) compacts

Compact ID	Carbonization Parameter					Heat-treatment Parameters			
	Molding Pressure (MPa)	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere
LEU07-OP1-Z061	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z062	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z063	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z064	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z065	22.4	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z066	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z067	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z068	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z069	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z070	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z071	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z072	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z073	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z074	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z075	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z076	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z077	22.4	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z078	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z079	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z080	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z081	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z082	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z083	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z084	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z085	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z086	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z087	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z088	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z089	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z090	20.9	4.7	950	1	flowing He	20	1800	1	vacuum

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Table 3-2 (cont.): Summary of process conditions used in making LEU07-OP1-Z (AGR-2 UCO Baseline) compacts

Compact ID	Carbonization Parameter					Heat-treatment Parameters			
	Molding Pressure (MPa)	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere
LEU07-OP1-Z091	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z092	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z093	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z094	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z095	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z096	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z097	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z098	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z099	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z100	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z101	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z102	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z103	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z104	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z105	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z106	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z107	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z108	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z109	22.4	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z110	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z111	22.1	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z112	21.7	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z113	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z114	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z115	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z116	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z117	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z118	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z119	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z120	20.9	4.7	950	1	flowing He	20	1800	1	vacuum

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Table 3-2 (cont.): Summary of process conditions used in making LEU07-OP1-Z (AGR-2 UCO Baseline) compacts

Compact ID	Carbonization Parameter					Heat-treatment Parameters			
	Molding Pressure (MPa)	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere
LEU07-OP1-Z121	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z122	22.4	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z123	22.4	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z124	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z125	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z126	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z127	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z128	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z129	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z130	21.7	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z131	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z132	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z133	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z134	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z135	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z136	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z137	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z138	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z139	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z140	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z141	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z142	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z143	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z144	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z145	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z146	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z147	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z148	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z149	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z150	20.9	4.7	950	1	flowing He	20	1800	1	vacuum

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Table 3-2 (cont.): Summary of process conditions used in making LEU07-OP1-Z (AGR-2 UCO Variant) compacts

Compact ID	Carbonization Parameter					Heat-treatment Parameters			
	Molding Pressure (MPa)	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere	Heating Rate (°C/min.)	Max. Temp. (°C)	Hold Time (hrs.)	Atmosphere
LEU07-OP1-Z151	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z152	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z153	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z154	20.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU07-OP1-Z155	20.9	4.7	950	1	flowing He	20	1800	1	vacuum

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4 Impurity analysis of matrix, resin, and graphites

The AGR-2 Fuel Specification (SPC-923) puts maximum limits on the elemental impurities Al, Ca, Ti, V, Cr, Mn, Fe, Co, and Ni. The natural graphite, synthetic graphite, and thermosetting resin used to make the matrix/overcoat material may contain these impurities. Therefore, the selection of graphites and resin used to make the matrix must have low concentrations of these impurities to ensure that the compacts made from the matrix will be within specification. Subsequently, part of the compacting development effort was selection and qualification of natural graphite, synthetic graphite, and resin. A graphite or resin was considered "qualified" if it could produce a compact that was within specification on impurities. The AGR-1 compacts showed that compacts could be made from these matrix constituents and pass the impurity specification. The qualification process involved receiving natural graphite and synthetic graphite and testing them via glow discharge mass spectrometry (GDMS) in order to establish their initial impurity concentrations. The graphites and resin were then combined to produce matrix that was carbonized and heat treated in powder form. The impurity levels in the heat treated matrix was then also measured by GDMS.

Table 4-1 shows the initial impurity levels for the natural graphite and synthetic graphite that were used to make LEU07-OP1-Z compacts. Natural graphite (Asbury Graphite Mills RD13371), synthetic graphite (SGL Carbon KRB2000), and thermosetting resin (Hexion Durite SC1008-lot LK8JD0450) were combined in a weight ratio of 64:16:20 to make the matrix. Four batches of matrix were produced: RDKrS-011309, RDKrS-012909, RDKrS-020209, and RDKrS-021309. A sample of the RDKrS-011309 matrix was carbonized and heat treated in powder form prior to being tested for impurities by GDMS. The other matrix batches were not tested because they were made up of the same starting materials. Notice that the heat treatment processes significantly reduced impurity levels in the matrix for several elements.

Table 4-1: Matrix constituents that were used in AGR-2 LEU07-OP1-Z compacts

Element	Impurity concentration (ppm)		
	Natural Graphite-RD13371	Synthetic Graphite-KRB2000	Heat treated Matrix-RDKrS-011309
Element	Concentration (ppm)	Concentration (ppm)	Concentration (ppm)
Al	36	0.35	<0.05
Ca	9.4	0.7	0.45
Ti	0.43	0.06	0.73
V	0.6	0.02	6.3
Cr	4.5	<0.5	<0.5
Mn	0.54	<0.05	<0.05
Fe	34	1.4	0.03
Co	<0.05	0.25	<0.05
Ni	0.37	1.2	<0.1

The following pages show the impurity analysis reports for the natural graphite, synthetic graphite, and matrix sample listed in Table 4-1. Also attached is the certificate of analysis for the resin from Hexion. Note that an expiration date was set for the resin of 6 months from the manufacture date. LEU07-OP1-Z compacting was completed on 4/02/09.

SHIVA TECHNOLOGIES
6707 Brooklawn Parkway
Syracuse, New York 13211

GDMS
ANALYTICAL REPORT

Telephone (315)431-9900
FAX (315) 431-9800
E-mail info@shivatec.com

ORNL/TM-2009/305

Customer: **UT-Battelle Oak Ridge** *P.O. #* **MCH4-0191**
Date: 27-Dec-03 *Job #* UM4335

Customer ID: **Graphite** *Shiva ID:* U031218080
AGM RD13371

Element	Concentration [ppm wt]	Element	Concentration [ppm wt]
Li	< 0.01	Pd	< 0.1
Be	< 0.01	Ag	< 0.1
B	0.17	Cd	< 0.1
C	Matrix	In	Binder
N	-	Sn	< 0.5
O	-	Sb	< 0.5
F	< 5	Te	< 0.1
Na	2.9	I	< 0.1
Mg	4.8	Cs	< 0.1
Al	36	Ba	13
Si	240	La	< 0.5
P	1.6	Ce	0.08
S	85	Pr	< 0.05
Cl	0.8	Nd	< 0.05
K	1.5	Sm	< 0.05
Ca	9.4	Eu	< 0.05
Sc	< 0.05	Gd	< 0.05
Ti	0.43	Tb	< 0.05
V	0.6	Dy	< 0.05
Cr	4.5	Ho	< 0.05
Mn	0.54	Er	< 0.05
Fe	34	Tm	< 0.05
Co	< 0.05	Yb	< 0.05
Ni	0.37	Lu	< 0.05
Cu	1.7	Hf	< 0.05
Zn	< 0.1	Ta	< 5
Ga	< 0.1	W	3.1
Ge	< 0.1	Re	< 0.05
As	< 0.1	Os	< 0.05
Se	< 0.1	Ir	< 0.05
Br	< 0.1	Pt	< 0.05
Rb	< 0.05	Au	< 0.1
Sr	0.19	Hg	< 0.5
Y	0.95	Tl	< 0.1
Zr	0.26	Pb	< 0.5
Nb	< 0.1	Bi	< 0.1
Mo	< 0.05	Th	< 0.05
Ru	< 0.1	U	< 0.05
Rh	< 0.1		

AN ISO 9002 Registered Company

Reviewed by David Shum

SHIVA TECHNOLOGIES
6707 Brooklawn Parkway
Syracuse, New York 13211

GDMS ANALYTICAL REPORT

Telephone (315)431-9900
FAX (315) 431-9800
E-mail info@shivatec.com

Customer: **UT-Battelle Oak Ridge** *P.O. #* **MCH4-0191**
Date: 26-Dec-03 *Job #* UM4335

Customer ID: **Graphite SGL** *Shiva ID:* U031218078

Element	Concentration [ppm wt]	Element	Concentration [ppm wt]
Li	< 0.01	Pd	< 0.1
Be	< 0.01	Ag	< 0.1
B	2.1	Cd	< 0.1
C	Matrix	In	Binder
N	-	Sn	< 0.5
O	-	Sb	< 0.5
F	< 5	Te	< 0.1
Na	0.45	I	< 0.5
Mg	0.2	Cs	< 0.5
Al	0.35	Ba	< 0.1
Si	3.1	La	< 0.5
P	0.11	Ce	< 0.05
S	9	Pr	< 0.05
Cl	3.2	Nd	< 0.05
K	0.45	Sm	< 0.05
Ca	0.7	Eu	< 0.05
Sc	< 0.05	Gd	< 0.05
Ti	0.06	Tb	< 0.05
V	0.02	Dy	< 0.05
Cr	< 0.5	Ho	< 0.05
Mn	< 0.05	Er	< 0.05
Fe	1.4	Tm	< 0.05
Co	0.25	Yb	< 0.05
Ni	1.2	Lu	< 0.05
Cu	< 0.5	Hf	< 0.05
Zn	< 0.5	Ta	< 5
Ga	< 0.1	W	2.7
Ge	< 0.1	Re	< 0.05
As	< 0.1	Os	< 0.05
Se	< 0.1	Ir	< 0.05
Br	< 0.1	Pt	< 0.05
Rb	< 0.05	Au	< 0.1
Sr	< 0.05	Hg	< 0.5
Y	< 0.05	Tl	< 0.1
Zr	< 0.05	Pb	< 0.5
Nb	< 0.1	Bi	< 0.1
Mo	< 0.05	Th	< 0.05
Ru	< 0.1	U	< 0.05
Rh	< 0.1		

AN ISO 9002 Registered Company

Reviewed by David Shum

EAG SM Evans Analytical Group

GDMS
ANALYTICAL REPORT

SHIVA Technologies
An Operating Unit of Evans Analytical Group LLC
6707 Brooklawn Parkway
Syracuse, New York 13211

Tel: (315) 431-9900
Fax: (315) 431-9800
Email info.ny@eaglabs.com
www.eaglabs.com

Customer: **UT-Battelle Oak Ridge** *P.O.#* CC
Date: 5-Feb-09 *Job #* S09N5953

Customer ID: **Graphite** *Shiva ID:* S090130048
RDKRS 11309

Element	Concentration [ppm wt]	Element	Concentration [ppm wt]
Li	< 0.01	Pd	< 0.1
Be	< 0.01	Ag	< 0.1
B	0.27	Cd	< 0.1
C	Matrix	In	Binder
N	-	Sn	< 0.5
O	-	Sb	< 0.5
F	< 5	Te	< 0.1
Na	16	I	< 20
Mg	< 0.5	Cs	< 0.1
Al	< 0.05	Ba	4.8
Si	12	La	< 0.5
P	0.12	Ce	< 0.5
S	5.1	Pr	< 0.05
Cl	4.2	Nd	< 0.05
K	< 0.1	Sm	< 0.05
Ca	0.45	Eu	< 0.05
Sc	< 0.05	Gd	< 0.05
Ti	0.73	Tb	< 0.05
V	6.3	Dy	< 0.05
Cr	< 0.5	Ho	< 0.05
Mn	< 0.05	Er	< 0.05
Fe	0.03	Tm	< 0.05
Co	< 0.05	Yb	< 0.05
Ni	< 0.1	Lu	< 0.05
Cu	< 0.1	Hf	< 0.05
Zn	0.31	Ta	< 5
Ga	< 0.1	W	< 0.05
Ge	< 0.1	Re	< 0.05
As	< 0.1	Os	< 0.05
Se	< 0.1	Ir	< 0.05
Br	< 0.1	Pt	< 0.05
Rb	< 0.05	Au	< 0.1
Sr	< 0.05	Hg	< 0.5
Y	< 0.05	Tl	< 0.1
Zr	0.32	Pb	< 0.5
Nb	< 0.1	Bi	< 0.1
Mo	< 0.05	Th	< 0.05
Ru	< 0.1	U	2.1
Rh	< 0.1		

Accreditations: ISO/IEC 17025, Nadcap

 Reviewed by Joseph Salisbury

HEXION Hexion Specialty Chemicals, Inc.

Certificate of Analysis

Received 1-8-09

Customer #: 32710
Customer Address:
CAPITAL RESIN CORPORATION
324 DERING AVENUE
COLUMBUS OH 43207
USA

Ship Date: 10/29/2008
DDN: 82444642
Customer - PO#: 901634
Date of MFG: 10/27/2008

Attention: KAY FREY
Customer Phone #: 614-445-7177
Customer Fax #: 614-445-7290

SAP Product #: 359917

Product Description: Durite SC-1008 DS3271/450#

Property	Value	Units	Specification Ranges		Test Method
Lot Number: LK8JD0450					
pH, 25C	8.02		7.90	8.50	IR-034
Specific Gravity	1.0823		1.0700	1.1000	IR-026
Viscosity	228	cPs	180	300	IR-111
In-process Tests	Passes	-	-	-	
Solids, Phenolic (ISO)	62.20	%	60.00	64.00	IR-063

CERTIFICATE OF COMPLIANCE

It is hereby certified that Hexion's Phenolic Resin, SC-1008, shipped in this lot has been produced in accordance with Military Specification (Resin, Phenolic, Laminating) MIL-R9299C, Grades A and B, dated December 3, 1968. It is recommended that SC-1008 be stored in a cool place. Storage life is materially increased by refrigerated storage. SC-1008 has a usable life of one month at 70 degrees F and six months at 40 degrees F.

Jeff A LaDuke
Quality Assurance

An ISO9001:2000 Certified Company

SHIPPED FROM: Hexion Specialty Chemicals • 6200 Campground Road
Louisville, KY 40216 • Phone: 502-449-6563

5 Characterization of coated particles

This section contains characterization data on the TRISO particle lot LEU07. The data was obtained according to product inspection plan AGR-CHAR-PIP-10R2, "Product Inspection Plan for AGR-2 Particles for Compacting - Preliminary Measurements". The data obtained by this inspection plan is used in support of compact fabrication and for input into measurements made for compact acceptance testing. There are no direct specifications for the measured parameters.

After washing, the G73J-14-93072A particles were renamed LEU07 and AGR-CHAR-PIP-10R2 was completed. This plan calls for measurement of average particle weight, diameter, envelope volume, and uranium content. OPyC open porosity is also obtained as part of the envelope volume analysis and reported for information only. The plan also calls for riffling of 20 gram aliquots for use as overcoater charges. Riffling at ORNL was done using a 10 position rotary riffler. After riffling out the characterization samples, forty-eight overcoater charges were prepared and labeled LEU07-Y01 through Y48. Additional ORNL characterization performed on another sample taken from G73J-14-93072A is provided in ORNL/TM-2008/133, "Data Compilation for AGR-2 UCO Baseline Coated Particle Batch G73J-14-93072A".

The following pages show the inspection report form (IRF-10) for the LEU07 particles. Following the IRF-10 inspection report form, which summarizes the results, are the individual data report forms for the measurements that were performed.

Inspection Report Form IRF-10: AGR-2 Particles for Compacting – Preliminary Measurements

Procedure:	AGR-CHAR-PIP-10 Rev. 2
Coated particle composite ID:	LEU07
Coated particle composite description:	AGR-2 UCO Baseline, from G73J-14-93072A

Property	Measured Data				Specification	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
	Mean (x)	Std. Dev. (s)	# measured (n)	t value	INL SPC-923				
Particle diameter (μm)	861.8	24	2174	1.646	Not Applicable				DRF-07 DRF-10
Average particle weight (g)	1.004E-03				Not Applicable				DRF-22
Average particle envelope volume (cm³)	3.29E-04				Not Applicable				DRF-31
OPyC open porosity (ml/m²)	0.400				Not Applicable				DRF-31
Average uranium per particle (g)	3.93E-04				Not Applicable				DRF-35

Comments

Particle weight from combined results of 2 independent measurements (W09010801 and W09011403).

[signature] 10-19-09

QC Supervisor — Date

[signature] 12/17/09

QA Reviewer — Date

Data Report Form DRF-07: Imaging of Particle Diameter and Aspect Ratio Using an Optical Microscope System

Procedure:	AGR-CHAR-DAM-07 Rev. 1
Operator:	Andrew K. Kercher
Sample ID:	LEU07-B01
Sample Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Folder name containing images:	\\Mc-agr\AGR\ImageProcessing\P09010901\

DMR Calibration Expiration Date:	10/28/09
Stage Micrometer Calibration Expiration Date:	2/13/09
Measured Value for 1200 µm in Stage Micrometer Image:	1200.9 µm

Andrew K. Kercher
Operator

January 9, 2009
Date

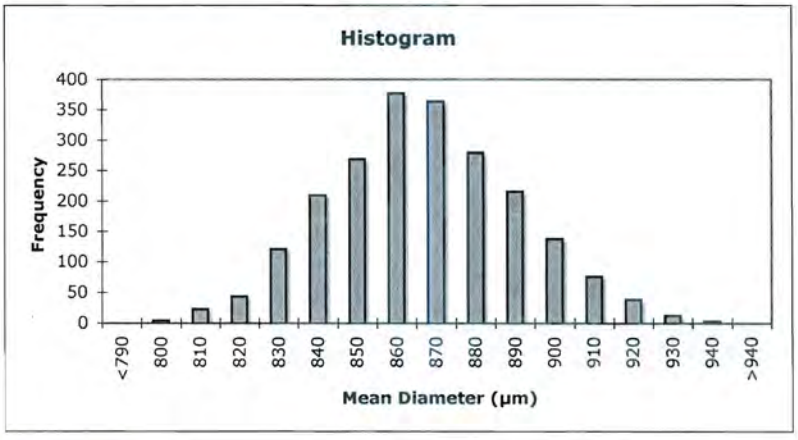
Data Report Form DRF-10A: Measurement of Particle Diameter

Procedure:	AGR-CHAR-DAM-10 Rev. 2
Operator:	Andrew K. Kercher
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09010901\
Sample ID:	LEU07-B01
Sample Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Folder name containing processed data:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09010901_output\

Number of particles analyzed:	2174
Mean of the average diameter of each particle (μm):	861.8
Standard deviation in the average diameter of each particle (μm):	24

Distribution of the average particle diameter (top binned)

Mean Diameter (μm)	*Frequency*
<790	0
800	4
810	23
820	44
830	121
840	209
850	269
860	377
870	364
880	279
890	216
900	138
910	76
920	39
930	12
940	3
>940	0



Andrew K. Kercher
Operator

January 12, 2009
Date

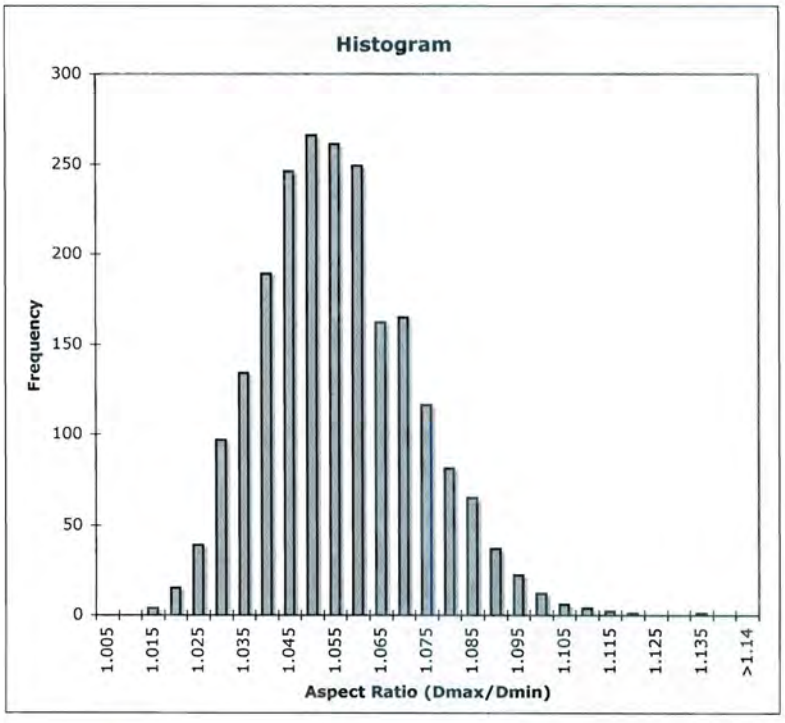
Data Report Form DRF-10B: Measurement of Particle Aspect Ratio (Dmax/Dmin)

Procedure:	AGR-CHAR-DAM-10 Rev. 2
Operator:	Andrew K. Kercher
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09010901\
Sample ID:	LEU07-B01
Sample Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Folder name containing processed data:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09010901_output\

Number of particles analyzed:	2174
Number of particles with aspect ratio ≥ 1.14	0
Average particle aspect ratio:	1.053

Distribution of the aspect ratio (top binned)

Aspect Ratio (D)	*Frequency*
1.005	0
1.010	0
1.015	4
1.020	15
1.025	39
1.030	97
1.035	134
1.040	189
1.045	246
1.050	266
1.055	261
1.060	249
1.065	162
1.070	165
1.075	116
1.080	81
1.085	65
1.090	37
1.095	22
1.100	12
1.105	6
1.110	4
1.115	2
1.120	1
1.125	0
1.130	0
1.135	1
1.140	0
>1.14	0



Operator

January 12, 2009
Date

Data Report Form DRF-22: Estimation of Average Particle Weight

Procedure:	AGR-CHAR-DAM-22 Rev. 1
Operator:	Dixie Barker
Particle Lot ID:	LEU07
Particle Lot Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\ParticleWeight\W09010801_DRF22R1.xls

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Weight of particles (g):	0.1174	0.1920	0.2865	0.3047	0.2650
Number of particles:	118	191	284	303	265
Average weight/particle (g):	9.949E-04	1.005E-03	1.009E-03	1.006E-03	1.000E-03

Mean average weight/particle (g):	1.003E-03
Standard error in mean average weight/particle (g):	2.45E-06

Dixie Barker
Operator

1-8-07
Date

Data Report Form DRF-22: Estimation of Average Particle Weight

Procedure:	AGR-CHAR-DAM-22 Rev. 1
Operator:	Dixie Barker
Particle Lot ID:	LEU07
Particle Lot Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\ParticleWeight\W09011403_DRF22R1.xls

	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
Weight of particles (g):	0.2836	0.1488	0.1596	0.1329	0.1461
Number of particles:	282	148	160	132	145
Average weight/particle (g):	1.006E-03	1.005E-03	9.975E-04	1.007E-03	1.008E-03

Mean average weight/particle (g):	1.005E-03
Standard error in mean average weight/particle (g):	1.82E-06

Dixie Barker
Operator

1-14-09
Date

Data Report Form DRF-31: Measurement of Open Porosity using a Mercury Porosimeter

Procedure:	AGR-CHAR-DAM-31 Rev. 1
Operator:	S. D. Nunn
Coated particle batch ID:	LEU07-D01
Batch Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Thermocouple Expiration Date:	5/15/09
Penetrometer Expiration Date:	7/10/09
Completed DRF Filename:	\\mc-agr\AGR\Porosimeter\S09012201\S09012201_DRF31R1.xls

Mean average weight/particle (g):	1.004E-03
Standard error in mean average weight/particle (g):	1.5E-06

Weight of particles (g):	3.9258
Approximate number of particles:	3910
Uncertainty in number of particles:	6
Total envelope volume of sample (cc):	1.285
Average envelope volume/particle (cc):	3.29E-04
Sample envelope density (g/cc):	3.055

Average particle diameter (microns):	8.56E+02
Average surface area/particle (cm2):	2.30E-02
Total sample surface area (cm2):	9.01E+01
Intruded mercury volume from 250-10,000 psia (cc):	3.60E-03
Open porosity (ml/m2):	4.00E-01

Comments
Particle weight from combined results of 2 independent measurements (W09010801 and W09011403).

S. D. Nunn — Operator

1/22/09 — Date

Data Report Form DRF-35: Fuel Particle Uranium Loading

Procedure:	AGR-CHAR-DAM-35 Rev. 0
Operator:	Fred Montgomery
Particle lot ID:	LEU07
Particle lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\UraniumLoading\LEU07_DRF35R0.xls

Mean average weight per particle (g):	1.004E-03
Standard error in mean average weight per particle (g):	1.5E-06

	Sample 1		Sample 2		Sample 3	
	Leach 1	Leach 2	Leach 1	Leach 2	Leach 1	Leach 2
Particle sample ID:	LEU07-E01		LEU07-F01		LEU07-B01	
Weight of particles:	3.8098		3.9149		4.0143	
Approximate number of particles:	3795		3899		3998	
Uncertainty in number of particles:	6		6		6	
Acid leach sample ID:	U09012101	U09012201	U09012102	U09012202	U09012104	U09012204
Radiochemical laboratory analysis number:	1658-001	1658-005	1658-002	1658-006	1658-004	1658-008
Weight U in leach (mg):	1496	0.073	1529	0.360	1569	0.370
Uncertainty in weight U in leach (mg):	6.0	0.0073	6.1	0.036	6.3	0.037
Total weight U in sample (mg):	1496		1529		1569	
Average weight U per particle (mg):	0.3943		0.3922		0.3924	
Uncertainty in average weight U per particle (mg):	0.0017		0.0017		0.0017	

Mean average uranium loading per particle (g):	3.930E-04
Standard error in mean average uranium loading per particle (g):	6.6E-07

Comments
Leach 1 was analyzed by Davies-Gray titration method. Leach 2 was analyzed by ICP-MS, due to low U concentration. A small amount of the crushed particle residue was lost during analysis of LEU07-G01 while removing the tape from the spex mill bottle. LEU07-B01 was analyzed in place of LEU07-G01 as sample #3. Particle weight from combined results of 2 independent measurements (W09010801 and W09011403). Davies-Gray Initial known U recovery: 100.60%; final known U recovery 100.20% Blind titration U recovery 100.4%. Uncertainty in Davies-Gray (0.4%) based on average of measured % recovery data for LEU06,07,08,09. Data checked against official results of analyses for RMAL1658 on 5/26/2009 by FCM

Fred C. Montgomery
Operator

10-19-2009
Date

6 Characterization of overcoated particles

This section contains characterization data on the overcoated particle lot LEU07-OP1. The data was obtained according to product inspection plan AGR-CHAR-PIP-11R0, "Product Inspection Plan for AGR-2 Overcoated Particles for Compacting". The data obtained by this inspection plan is used in support of compact fabrication and for input into measurements made for compact acceptance testing. There are no direct specifications for the measured parameters.

After overcoating, the overcoated particles from LEU07-Y01 through Y48 were combined and homogenized into an overcoated particle composite. The overcoated particle composite was labeled LEU07-OP1 and AGR-CHAR-PIP-11R0 was completed. This plan calls for measurement of average overcoated particle weight and diameter. The plan also calls for riffling of compact charges for pressing. One hundred and eighty compact charges were prepared and labeled LEU07-OP1-G001 through G180. A record of the weight of each compact charge can be found on data report form DRF-24D, in section 7.

The following pages show the inspection report form (IRF-11) for the LEU07-OP1 overcoated particles. Following the IRF-11 inspection report form, which summarizes the results, are the individual data report forms for the measurements that were performed.

The average thickness of the overcoat can be estimated from the increase in the average particle size after overcoating, (1332 μm - 862 μm)/2 = 235 μm. The increase in average particle weight was (2.018 mg - 1.004 mg) = 1.014 mg. From these values, the average density of the overcoating prior to compacting can be estimated to be 1.12 g/cm^3.

Inspection Report Form IRF-11: AGR-2 Overcoated Particles for Compacting

Procedure:	AGR-CHAR-PIP-11 Rev. 0
Overcoated particle composite ID:	LEU07-OP1
Overcoated particle composite description:	AGR-2 UCO Baseline, from G73J-14-93072A

Property	Measured Data				Specification	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
	Mean (x)	Std. Dev. (s)	# measured (n)	t value	INL SPC-923				
Overcoated particle diameter (µm)	1332.0	86	951	1.646	Not Applicable				DRF-29 DRF-30
Average overcoated particle weight (g)	2.018E-03				Not Applicable				DRF-22

Comments

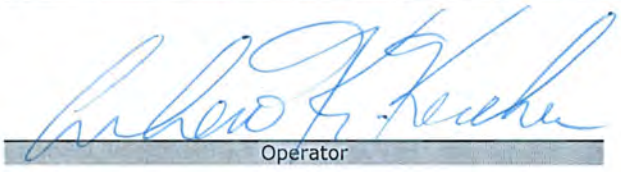
QC Supervisor — Date: 10-19-09

QA Reviewer — Date: 12/12/09

Data Report Form DRF-29: Imaging of Overcoated Particle Diameter and Aspect Ratio Using an Optical Microscope System

Procedure:	AGR-CHAR-DAM-29 Rev. 1
Operator:	Andrew K. Kercher
Sample ID:	LEU07-OP1-B01
Sample Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\P09022001\

DMR Calibration Expiration Date:	10/28/2009
Stage Micrometer Calibration Expiration Date:	2/10/2014
Measured Value for 2500 µm in Stage Micrometer Image:	2501.8 µm



Operator

February 20, 2009

Date

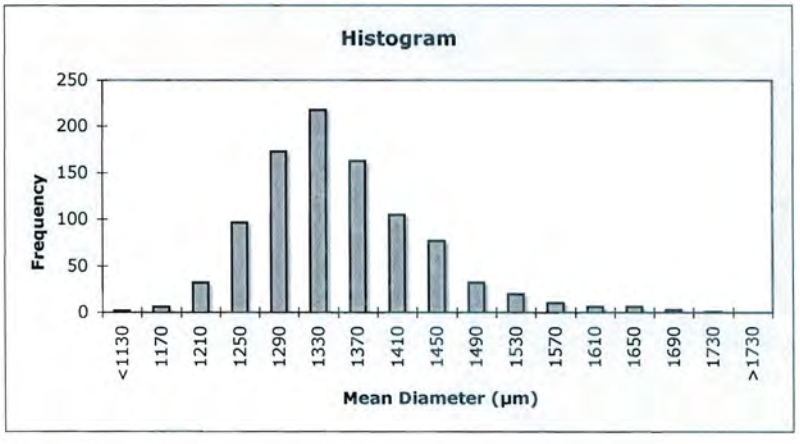
Data Report Form DRF-30A: Measurement of Over-coated Particle Diameter

Procedure:	AGR-CHAR-DAM-30 Rev. 0
Operator:	Andrew K. Kercher
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09022001\
Sample ID:	LEU07-OP1-B01
Sample Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Folder name containing processed data:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09022001_output\

Number of particles analyzed:	951
Mean of the average diameter of each particle (μm):	1332.0
Standard deviation in the average diameter of each particle (μm):	86

Distribution of the average particle diameter (top binned)

Mean Diameter (μm)	*Frequency*
<1130	2
1170	6
1210	32
1250	97
1290	173
1330	218
1370	163
1410	105
1450	77
1490	32
1530	20
1570	10
1610	6
1650	6
1690	3
1730	1
>1730	0



Andrew K. Kercher
Operator

February 23, 2009
Date

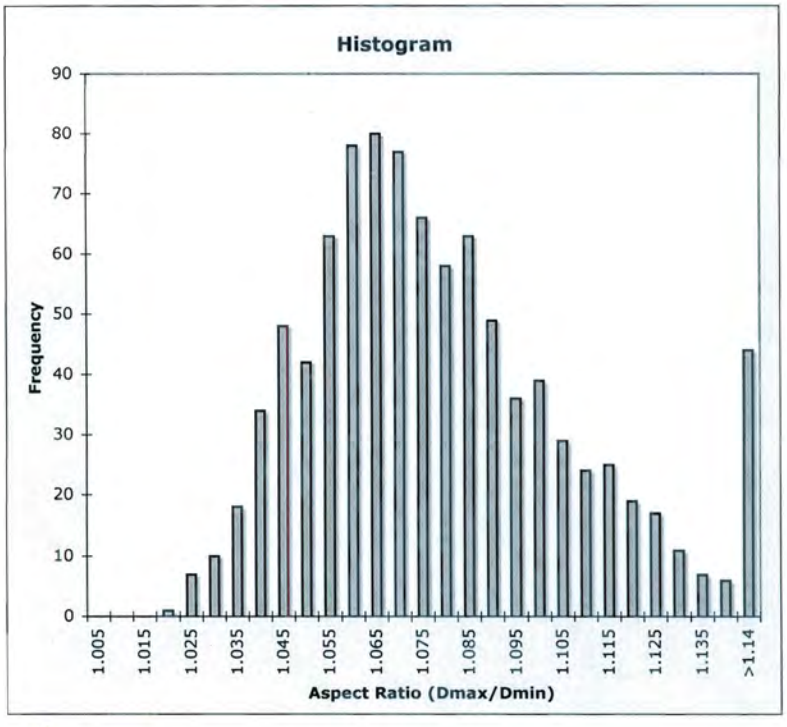
Data Report Form DRF-30B: Measurement of Over-coated Particle Aspect Ratio (Dmax/Dmin)

Procedure:	AGR-CHAR-DAM-30 Rev. 0
Operator:	Andrew K. Kercher
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09022001\
Sample ID:	LEU07-OP1-B01
Sample Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Folder name containing processed data:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09022001_output\

Number of particles analyzed:	951
Average particle aspect ratio:	1.077

Distribution of the aspect ratio (top binned)

Aspect Ratio (D)	*Frequency*
1.005	0
1.010	0
1.015	0
1.020	1
1.025	7
1.030	10
1.035	18
1.040	34
1.045	48
1.050	42
1.055	63
1.060	78
1.065	80
1.070	77
1.075	66
1.080	58
1.085	63
1.090	49
1.095	36
1.100	39
1.105	29
1.110	24
1.115	25
1.120	19
1.125	17
1.130	11
1.135	7
1.140	6
>1.14	44



Andrew K. Kercher
Operator

February 23, 2009
Date

Data Report Form DRF-22: Estimation of Average Particle Weight

Procedure:	AGR-CHAR-DAM-22 Rev. 1
Operator:	Dixie Barker
Particle Lot ID:	LEU07-OP1-C01
Particle Lot Description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\ParticleWeight\W09021901_DRF22R1.xls

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Weight of particles (g):	0.2874	0.3029	0.3274	0.3528	0.3341
Number of particles:	142	153	161	174	165
Average weight/particle (g):	2.024E-03	1.980E-03	2.034E-03	2.028E-03	2.025E-03

Mean average weight/particle (g):	2.018E-03
Standard error in mean average weight/particle (g):	9.69E-06

Dixie Barker
Operator

2-19-2009
Date

7 Characterization of compacts

This section contains acceptance testing data on the compact lot LEU07-OP1-Z. The data was obtained according to product inspection plan AGR-CHAR-PIP-12R1, "Product Inspection Plan for AGR-2 UCO Fuel Compact Lots". This compact lot was determined to not satisfy the specifications in section 3.3 of the AGR-2 Fuel Specification (INL SPC-923, Rev. 3). The final disposition of this compact lot was to not use for the compacts for the AGR-2 irradiation test, but to retain the compacts in storage at ORNL and INL for possible future analysis or methods development.

After compacting, 155 compacts were selected from LEU07-OP1-G001 through G180 for use. Compacts with obvious processing defects, chips, or undesirable dimensions were sorted out and not included in the 155 compacts selected for the final fuel compact lot. This down-select was part of the compacting process and was performed prior to random selection of compacts for acceptance testing. It should be understood that the results in this section and the acceptance testing are only relevant for the final 155 compact lot from which random representative samples were drawn for characterization. As instructed in AGR-CHAR-PIP-12R1, these 155 compacts were randomized and relabeled as LEU07-OP1-Z001 through Z155. A record of the original G-number for each Z-numbered compact can be found on data report form DRF-24C, in this section. After relabeling, the compacts were characterized for product acceptance according to product inspection plan PIP-12. This plan calls for measurement of compact length, diameter, mass, matrix density, uranium content, impurity content, and determination of defect fractions for exposed uranium, defective SiC, uranium dispersion due to defective IPyC, and defective OPyC.

The following pages show the inspection report forms (IRF-12A, IRF-12B, IRF-12C, IRF-12D) for the LEU07-OP1-Z compacts. Following the IRF-12 inspection report forms, which summarize the results, are the individual data report forms for the measurements that were performed. Note that the leach-burn-leach (LBL) analysis is performed on sets of 20 compacts at a time, in four sample groups with 5 compacts in each sample. Inspection report forms IRF-12B, IRF-12C, and IRF-12D summarize the results from each set of 20 compacts. Inspection report form IRF-12A summarizes all the analyses. The mean and standard deviation for the impurity analyses (IRF-12B) , the uranium contamination fraction or effective number of exposed kernels before the burn (IRF-12C) and the defective SiC defect fraction or number of exposed kernels after the burn (IRF-12D) are calculated from the combined results of all the relevant sample groups. These combined results, which are then entered into IRF-12A, are provided in Table 7-1 and Table 7-2 below.

Table 7-1: Summary of impurity analysis for LEU07-OP1-Z compacts

Compact ID numbers:	060, 046, 122, 146, 130	141, 138, 111, 064, 053	023, 076, 006, 040, 034	139, 083, 087, 145, 049	005, 013, 107, 058, 062	135, 017, 022, 018, 125	037, 027, 097, 025, 048	129, 149, 100, 029, 066	055, 030, 085, 108, 140	026, 103, 095, 119, 077	112, 009, 155, 056, 001	144, 134, 051, 115, 088	Mean	Standard Deviation
Number of compacts:	5	5	5	5	5	5	5	5	5	5	5	5		
Iron														
Deconsolidation-leach (DRF-26A) (μg):	29.36	29.77	29.46	29.36	10.14	10.34	10.63	10.51	10.44	10.79	10.67	10.51		
Burn-leach (DRF-26B) (μg):	4.65	20.29	3.10	2.99	5.67	9.44	6.63	8.28	5.65	5.97	6.63	5.76		
Total leached (μg):	34.01	50.05	32.56	32.34	15.80	19.78	17.26	18.79	16.09	16.76	17.30	16.26		
Fe outside SiC (μg/compact):	**6.80**	**10.01**	**6.51**	**6.47**	**3.16**	**3.96**	**3.45**	**3.76**	**3.22**	**3.35**	**3.46**	**3.25**	**4.78**	**2.17**
Chromium														
Deconsolidation-leach (DRF-26A) (μg):	1.79	2.03	2.43	2.17	2.21	2.71	1.90	2.47	2.33	2.11	1.86	1.90		
Burn-leach (DRF-26B) (μg):	0.73	0.72	0.70	0.64	0.76	0.89	0.89	0.90	0.72	0.78	0.86	0.70		
Total leached (μg):	2.52	2.74	3.13	2.81	2.97	3.60	2.79	3.38	3.04	2.89	2.72	2.60		
Cr outside SiC (μg/compact):	**0.50**	**0.55**	**0.63**	**0.56**	**0.59**	**0.72**	**0.56**	**0.68**	**0.61**	**0.58**	**0.54**	**0.52**	**0.59**	**0.06**
Manganese														
Deconsolidation-leach (DRF-26A) (μg):	1.36	1.38	1.36	1.36	0.47	0.48	0.49	0.49	0.49	0.50	0.49	0.49		
Burn-leach (DRF-26B) (μg):	0.21	0.20	0.21	0.19	0.19	0.19	0.20	0.19	0.19	0.19	0.20	0.19		
Total leached (μg):	1.56	1.58	1.57	1.55	0.66	0.67	0.69	0.68	0.68	0.69	0.69	0.68		
Mn outside SiC (μg/compact):	**0.31**	**0.32**	**0.31**	**0.31**	**0.13**	**0.13**	**0.14**	**0.14**	**0.14**	**0.14**	**0.14**	**0.14**	**0.20**	**0.09**
Cobalt														
Deconsolidation-leach (DRF-26A) (μg):	1.16	1.17	1.16	1.16	0.40	0.41	0.42	0.41	0.41	0.42	0.42	0.41		
Burn-leach (DRF-26B) (μg):	0.09	0.09	0.09	0.09	0.16	0.16	0.17	0.16	0.16	0.16	0.17	0.16		
Total leached (μg):	1.25	1.26	1.25	1.24	0.56	0.57	0.58	0.58	0.57	0.59	0.59	0.58		
Co outside SiC (μg/compact):	**0.25**	**0.25**	**0.25**	**0.25**	**0.11**	**0.11**	**0.12**	**0.12**	**0.11**	**0.12**	**0.12**	**0.12**	**0.16**	**0.07**
Nickel														
Deconsolidation-leach (DRF-26A) (μg):	5.70	5.78	5.72	5.70	1.97	2.01	2.06	2.04	2.02	2.10	2.07	2.04		
Burn-leach (DRF-26B) (μg):	0.96	0.94	0.93	0.83	0.82	0.93	0.89	0.94	1.11	0.93	0.90	0.85		
Total leached (μg):	6.66	6.72	6.65	6.53	2.78	2.94	2.95	2.98	3.13	3.02	2.97	2.89		
Ni outside SiC (μg/compact):	**1.33**	**1.34**	**1.33**	**1.31**	**0.56**	**0.59**	**0.59**	**0.60**	**0.63**	**0.60**	**0.59**	**0.58**	**0.84**	**0.36**
Transition Metals														
Cr+Mn+Co+Ni outside SiC (μg/compact):	**2.40**	**2.46**	**2.52**	**2.43**	**1.39**	**1.55**	**1.40**	**1.52**	**1.49**	**1.44**	**1.39**	**1.35**	**1.78**	**0.50**
Calcium														
Deconsolidation-leach (DRF-26A) (μg):	67.14	74.30	124.36	74.38	24.60	37.31	25.80	25.50	45.30	39.18	49.14	25.50		
Burn-leach (DRF-26B) (μg):	118.70	121.03	112.44	102.32	136.72	160.04	167.65	199.10	109.74	116.39	90.73	115.81		
Total leached (μg):	185.84	195.33	236.81	176.70	161.32	197.35	193.45	224.60	155.04	155.57	139.87	141.31		
Ca outside SiC (μg/compact):	**37.17**	**39.07**	**47.36**	**35.34**	**32.26**	**39.47**	**38.69**	**44.92**	**31.01**	**31.11**	**27.97**	**28.26**	**36.05**	**6.22**
Aluminum														
Deconsolidation-leach (DRF-26A) (μg):	74.72	84.31	63.69	72.66	235.12	75.87	63.69	71.66	71.17	64.86	56.07	63.95		
Burn-leach (DRF-26B) (μg):	73.10	71.55	73.81	71.17	63.01	66.18	65.94	67.21	60.71	74.56	62.78	57.00		
Total leached (μg):	147.82	155.87	137.50	143.83	298.13	142.05	129.63	138.87	131.89	139.42	118.85	120.96		
Al outside SiC (μg/compact):	**29.56**	**31.17**	**27.50**	**28.77**	**59.63**	**28.41**	**25.93**	**27.77**	**26.38**	**27.88**	**23.77**	**24.19**	**30.08**	**9.54**
Titanium														
Deconsolidation-leach (DRF-26A) (μg):	6.05	7.72	7.78	8.23	6.75	9.00	6.76	9.90	7.65	7.17	5.31	6.62		
Burn-leach (DRF-26B) (μg):	8.87	7.48	10.06	7.08	7.42	5.70	8.12	5.82	7.95	8.20	9.06	8.23		
Total leached (μg):	14.92	15.20	17.84	15.31	14.17	14.70	14.88	15.72	15.60	15.37	14.37	14.85		
Ti outside SiC (μg/compact):	**2.98**	**3.04**	**3.57**	**3.06**	**2.83**	**2.94**	**2.98**	**3.14**	**3.12**	**3.07**	**2.87**	**2.97**	**3.05**	**0.19**
Vanadium														
Deconsolidation-leach (DRF-26A) (μg):	40.25	40.05	37.61	42.69	38.05	44.71	37.05	41.40	42.77	42.07	39.93	38.82		
Burn-leach (DRF-26B) (μg):	53.93	53.39	54.92	53.74	48.96	50.11	46.19	46.00	49.25	55.51	52.53	43.79		
Total leached (μg):	94.19	93.44	92.53	96.43	87.01	94.82	83.24	87.40	92.02	97.58	92.46	82.61		
V outside SiC (μg/compact):	**18.84**	**18.69**	**18.51**	**19.29**	**17.40**	**18.96**	**16.65**	**17.48**	**18.40**	**19.52**	**18.49**	**16.52**	**18.23**	**0.99**
Titanium and Vanadium														
Ti + V outside SiC (μg/compact):	**21.82**	**21.73**	**22.07**	**22.35**	**20.24**	**21.90**	**19.62**	**20.62**	**21.52**	**22.59**	**21.37**	**19.49**	**21.28**	**1.04**

Table 7-2: Summary of uranium contamination and SiC defect analysis for LEU07-OP1-Z compacts

Compact ID numbers	Number of compacts	Effective number of exposed kernels before burn	Number of kernels leached after burn
060, 046, 122, 146, 130	5	1.1	0
141, 138, 111, 064, 053	5	1.1	0
023, 076, 006, 040, 034	5	0.0	0
139, 083, 087, 145, 049	5	0.6	0
123, 147, 152, 035, 010	5	0.0	0
110, 045, 042, 002, 086	5	2.0	0
136, 078, 052, 070, 059	5	1.1	0
033, 044, 124, 075, 032	5	0.2	0
005, 013, 107, 058, 062	5	2.0	0
135, 017, 022, 018, 125	5	0.0	0
037, 027, 097, 025, 048	5	0.0	0
129, 149, 100, 029, 066	5	1.0	0
055, 030, 085, 108, 140	5	1.1	0
026, 103, 095, 119, 077	5	1.1	0
112, 009, 155, 056, 001	5	0.0	0
144, 134, 051, 115, 088	5	0.0	0
142, 047, 011, 092, 038	5	0.0	0
069, 050, 039, 150, 028	5	0.0	0
114, 133, 127, 091, 061	5	2.3	0
099, 024, 031, 104, 101	5	1.0	0
Total:	**100**	**14.6**	**0**

One compact was measured to be 0.046 mm longer than the specified 25.40 mm upper limit for compact length. This minor deviation is not expected to affect the compact performance and was not associated by significant deviations in the compacting force or matrix density. It was therefore determined that the compact could be used as is. This was documented on ORNL nonconformance report NCR-X-MSTD-AGR-10-01.

After compacts were electrolytically deconsolidated and leached, uranium was detected at a level equivalent to ~15 kernels out of the ~317690 particles leached. This corresponds to a binomial distribution defect fraction of ≤7.3E-5 at 95% confidence, which is above the specified limit of ≤2.0E-5. Analysis of as-coated TRISO particles from the same batch (G73J-14-93072A) showed a similar defect fraction. Further analysis determined that the source of the defects was cracked TRISO coatings on a small fraction of otherwise normal particles. This damage is thought to have occurred at B&W during removal of the particles from the coating furnace via a suction transfer system. Because the suspected root cause of this nonconformance was not related to the compacting and characterization activities at ORNL, the nonconformance report was issued by INL. A decision was made to not use these compacts for the AGR-2 irradiation test because of the higher than desired level of exposed uranium in the as-manufactured fuel. This disposition was documented on INL NCR-44791. However, because this fuel has been well characterized, it will be retained in storage at INL and ORNL and may be used for methods development or other analyses.

Particles from 20 compacts were analyzed for uranium dispersion, which is an indicator of a defective IPyC layer. Excessive permeability in the IPyC may result in chlorine intrusion during

SiC deposition and subsequent uranium leaching out of the kernel and into the buffer during compact heat treatment. A large defect fraction was observed, 443 out of 63538 particles. This corresponds to a binomial distribution defect fraction of ≤7.6E-3 at 95% confidence, which is well above the specified limit of ≤1.0E-4. Analysis of as-coated TRISO particles from the same batch (G73J-14-93072A) showed a similar defect fraction. The cause of the uranium dispersion is not completely known, although it is thought to be due to possible abnormal porosity in the IPyC layers of some of the particles. Because the suspected root cause of this nonconformance was not related to the compacting and characterization activities at ORNL, the nonconformance report was issued by INL. A decision was made to not use these compacts for the AGR-2 irradiation test because of the higher than desired level of uranium dispersion in the as-manufactured fuel. This disposition was documented on INL NCR-44792. However, because this fuel has been well characterized, it will be retained in storage at INL and ORNL and may be used for methods development or other analyses.

Inspection Report Form IRF-12A: AGR-2 UCO Fuel Compact Lots

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers of compacts not consumed by acceptance testing:	003 004 007 008 012 014 015 016 019 020 021 036 041 043 054 063 065 067 068 071 072 073 074 080 081 082 084 089 093 094 098 102 105 106 109 113 116 117 118 121 126 128 131 132 137 143 148 151

Property	Measured Data: Mean (x)	Std. Dev. (s)	Measurements (n)	k or t value	Specification: INL SPC-923 Revison 3	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
Uranium loading (gU/compact)	1.251	0.005	6	2.015	1.265 ± 0.07	A = x - ts/√n ≥ 1.195	1.247	pass	DRF-25
						B = x + ts/√n ≤ 1.335	1.255	pass	
Compact diameter (mm)	See DRF-24				12.22 - 12.46	All available for irradiation test meet specification	See DRF-24	fail	DRF-24
Compact length (mm)					25.02 - 25.40				
Compact matrix density (g/cm^3)					≥1.45			pass	
Iron content outside SiC (µg/compact)	4.78	2.17	12	1.796	mean ≤ 25	B = x + ts/√n ≤ 25	5.9	pass	IRF-12B DRF-26
				3.747	dispersion ≤0.01 ≥ 100	D = x + √3ks < 100	18.9	pass	
Chromium content outside SiC (µg/compact)	0.59	0.06	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	0.6	pass	IRF-12B DRF-26
Manganese content outside SiC (µg/compact)	0.20	0.09	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	0.2	pass	IRF-12B DRF-26
Cobalt content outside SiC (µg/compact)	0.16	0.07	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	0.2	pass	IRF-12B DRF-26
Nickel content outside SiC (µg/compact)	0.84	0.36	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	1.0	pass	IRF-12B DRF-26
Cr + Mn + Co + Ni content outside SiC (µg/compact)	1.78	0.50	12	3.747	dispersion ≤0.01 ≥ 200	D = x + √3ks < 200	5.0	pass	IRF-12B DRF-26
Calcium content outside SiC (µg/compact)	36.05	6.22	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	39.3	pass	IRF-12B DRF-26
Aluminum content outside SiC (µg/compact)	30.08	9.54	12	1.796	mean ≤ 50	B = x + ts/√n ≤ 50	35.0	pass	IRF-12B DRF-26
Ti + V content outside SiC (µg/compact)	21.28	1.04	12	1.796	mean ≤ 240	B = x + ts/√n ≤ 240	21.8	pass	IRF-12B DRF-26

Property	Measured Data: # of compacts	# of particles	Specification: INL SPC-923 Revison 2	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
Uranium contamination fraction (g exposed U/gram U in compact)	100	317690	≤ 2.0 x 10^{-5}	≤1 effectively exposed kernel in ≥237192 particles or ≤2 effectively exposed kernels in ≥314788 particles	14.6	fail	IRF-12C DRF-26
Defective SiC coating fraction (fraction of total particles)	60	190614	≤ 1.0 x 10^{-4}	≤2 leached kernels in ≥62956 particles or ≤6 leached kernels in ≥118422 particles	0	pass	IRF-12D DRF-26
Defective IPyC coating fraction (fraction of total particles)	20	63538	≤ 1.0 x 10^{-4}	≤1 with excessive U dispersion in ≥47437 particles or ≤2 with excessive U dispersion in ≥62956 particles	443	fail	DRF-28
Defective OPyC coating fraction (fraction of total particles)	1	3177	≤ 0.01	≤6 cracked or missing OPyC in ≥1182 particles	0	pass	DRF-27

Comments

One compact was outside of the length specification by +0.046 mm. This non-conformance was documented on ORNL NCR-X-MSTD-AGR-10-01 with a disposition of use as is.
A 15/317690 uranium contamination fraction is above the specified limit and corresponds to <7.3e-5 at 95% confidence. This non-conformance was documented on INL NCR-44791 with a disposition of do not use for AGR-2 irradiation test, but retain for other uses.
A 443/63538 defective IPyC coating fraction is above the specified limit and corresponds to <7.6e-3 at 95% confidence. This non-conformance was documented on INL NCR-44792 with a disposition of do not use for AGR-2 irradiation test, but retain for other uses.

QC Supervisor	Date: 12-17-09

Accept compact lot (Yes or No):	**No**

QA Reviewer	Date: 12/17/09

Inspection Report Form IRF-12B: Summary of Impurites Outside SiC - Maximum Corrected Values

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	060, 046, 122, 146, 130	141, 138, 111, 064, 053	023, 076, 006, 040, 034	139, 083, 087, 145, 049	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Deconsolidation-leach (DRF-26A) (µg):	29.36	29.77	29.46	29.36		
Burn-leach (DRF-26B) (µg):	4.65	20.29	3.10	2.99		
Total leached (µg):	34.01	50.05	32.56	32.34		
Fe outside SiC (µg/compact):	**6.80**	**10.01**	**6.51**	**6.47**	**7.45**	**1.71**
Chromium						
Deconsolidation-leach (DRF-26A) (µg):	1.79	2.03	2.43	2.17		
Burn-leach (DRF-26B) (µg):	0.73	0.72	0.70	0.64		
Total leached (µg):	2.52	2.74	3.13	2.81		
Cr outside SiC (µg/compact):	**0.50**	**0.55**	**0.63**	**0.56**	**0.56**	**0.05**
Manganese						
Deconsolidation-leach (DRF-26A) (µg):	1.36	1.38	1.36	1.36		
Burn-leach (DRF-26B) (µg):	0.21	0.20	0.21	0.19		
Total leached (µg):	1.56	1.58	1.57	1.55		
Mn outside SiC (µg/compact):	**0.31**	**0.32**	**0.31**	**0.31**	**0.314**	**0.003**
Cobalt						
Deconsolidation-leach (DRF-26A) (µg):	1.16	1.17	1.16	1.16		
Burn-leach (DRF-26B) (µg):	0.09	0.09	0.09	0.09		
Total leached (µg):	1.25	1.26	1.25	1.24		
Co outside SiC (µg/compact):	**0.25**	**0.25**	**0.25**	**0.25**	**0.250**	**0.002**
Nickel						
Deconsolidation-leach (DRF-26A) (µg):	5.70	5.78	5.72	5.70		
Burn-leach (DRF-26B) (µg):	0.96	0.94	0.93	0.83		
Total leached (µg):	6.66	6.72	6.65	6.53		
Ni outside SiC (µg/compact):	**1.33**	**1.34**	**1.33**	**1.31**	**1.33**	**0.02**
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):	**2.40**	**2.46**	**2.52**	**2.43**	**2.45**	**0.05**
Calcium						
Deconsolidation-leach (DRF-26A) (µg):	67.14	74.30	124.36	74.38		
Burn-leach (DRF-26B) (µg):	118.70	121.03	112.44	102.32		
Total leached (µg):	185.84	195.33	236.81	176.70		
Ca outside SiC (µg/compact):	**37.17**	**39.07**	**47.36**	**35.34**	**39.73**	**5.31**
Aluminum						
Deconsolidation-leach (DRF-26A) (µg):	74.72	84.31	63.69	72.66		
Burn-leach (DRF-26B) (µg):	73.10	71.55	73.81	71.17		
Total leached (µg):	147.82	155.87	137.50	143.83		
Al outside SiC (µg/compact):	**29.56**	**31.17**	**27.50**	**28.77**	**29.25**	**1.54**
Titanium						
Deconsolidation-leach (DRF-26A) (µg):	6.05	7.72	7.78	8.23		
Burn-leach (DRF-26B) (µg):	8.87	7.48	10.06	7.08		
Total leached (µg):	14.92	15.20	17.84	15.31		
Ti outside SiC (µg/compact):	**2.98**	**3.04**	**3.57**	**3.06**	**3.16**	**0.27**
Vanadium						
Deconsolidation-leach (DRF-26A) (µg):	40.25	40.05	37.61	42.69		
Burn-leach (DRF-26B) (µg):	53.93	53.39	54.92	53.74		
Total leached (µg):	94.19	93.44	92.53	96.43		
V outside SiC (µg/compact):	**18.84**	**18.69**	**18.51**	**19.29**	**18.83**	**0.33**
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):	**21.82**	**21.73**	**22.07**	**22.35**	**21.99**	**0.28**

QC Supervisor

12-8-09

Date

Inspection Report Form IRF-12B: Summary of Impurites Outside SiC - Maximum Corrected Values

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	123, 147, 152, 035, 010	110, 045, 042, 002, 086	136, 078, 052, 070, 059	033, 044, 124, 075, 032	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Deconsolidation-leach (DRF-26A) (µg):	11.17	11.33	11.04	11.12		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Fe outside SiC (µg/compact):						
Chromium						
Deconsolidation-leach (DRF-26A) (µg):	1.81	2.64	1.47	2.87		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Cr outside SiC (µg/compact):						
Manganese						
Deconsolidation-leach (DRF-26A) (µg):	0.52	0.53	0.51	0.52		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Mn outside SiC (µg/compact):						
Cobalt						
Deconsolidation-leach (DRF-26A) (µg):	0.44	0.45	0.43	0.44		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Co outside SiC (µg/compact):						
Nickel						
Deconsolidation-leach (DRF-26A) (µg):	2.17	2.20	2.14	2.16		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Ni outside SiC (µg/compact):						
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):						
Calcium						
Deconsolidation-leach (DRF-26A) (µg):	54.99	95.72	90.93	180.97		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Ca outside SiC (µg/compact):						
Aluminum						
Deconsolidation-leach (DRF-26A) (µg):	79.33	69.45	66.58	89.97		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Al outside SiC (µg/compact):						
Titanium						
Deconsolidation-leach (DRF-26A) (µg):	5.93	8.20	4.41	8.41		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Ti outside SiC (µg/compact):						
Vanadium						
Deconsolidation-leach (DRF-26A) (µg):	39.98	42.08	38.56	42.17		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
V outside SiC (µg/compact):						
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):						

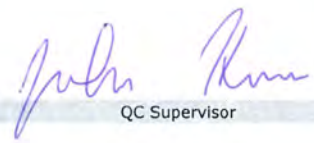
John Hunn — QC Supervisor

12-8-09 — Date

Inspection Report Form IRF-12B: Summary of Impurites Outside SiC - Maximum Corrected Values

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	005, 013, 107, 058, 062	135, 017, 022, 018, 125	037, 027, 097, 025, 048	129, 149, 100, 029, 066	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Deconsolidation-leach (DRF-26A) (µg):	10.14	10.34	10.63	10.51		
Burn-leach (DRF-26B) (µg):	5.67	9.44	6.63	8.28		
Total leached (µg):	15.80	19.78	17.26	18.79		
Fe outside SiC (µg/compact):	**3.16**	**3.96**	**3.45**	**3.76**	**3.58**	**0.35**
Chromium						
Deconsolidation-leach (DRF-26A) (µg):	2.21	2.71	1.90	2.47		
Burn-leach (DRF-26B) (µg):	0.76	0.89	0.89	0.90		
Total leached (µg):	2.97	3.60	2.79	3.38		
Cr outside SiC (µg/compact):	**0.59**	**0.72**	**0.56**	**0.68**	**0.64**	**0.07**
Manganese						
Deconsolidation-leach (DRF-26A) (µg):	0.47	0.48	0.49	0.49		
Burn-leach (DRF-26B) (µg):	0.19	0.19	0.20	0.19		
Total leached (µg):	0.66	0.67	0.69	0.68		
Mn outside SiC (µg/compact):	**0.13**	**0.13**	**0.14**	**0.14**	**0.135**	**0.002**
Cobalt						
Deconsolidation-leach (DRF-26A) (µg):	0.40	0.41	0.42	0.41		
Burn-leach (DRF-26B) (µg):	0.16	0.16	0.17	0.16		
Total leached (µg):	0.56	0.57	0.58	0.58		
Co outside SiC (µg/compact):	**0.11**	**0.11**	**0.12**	**0.12**	**0.115**	**0.002**
Nickel						
Deconsolidation-leach (DRF-26A) (µg):	1.97	2.01	2.06	2.04		
Burn-leach (DRF-26B) (µg):	0.82	0.93	0.89	0.94		
Total leached (µg):	2.78	2.94	2.95	2.98		
Ni outside SiC (µg/compact):	**0.56**	**0.59**	**0.59**	**0.60**	**0.58**	**0.02**
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):	**1.39**	**1.55**	**1.40**	**1.52**	**1.47**	**0.08**
Calcium						
Deconsolidation-leach (DRF-26A) (µg):	24.60	37.31	25.80	25.50		
Burn-leach (DRF-26B) (µg):	136.72	160.04	167.65	199.10		
Total leached (µg):	161.32	197.35	193.45	224.60		
Ca outside SiC (µg/compact):	**32.26**	**39.47**	**38.69**	**44.92**	**38.84**	**5.18**
Aluminum						
Deconsolidation-leach (DRF-26A) (µg):	235.12	75.87	63.69	71.66		
Burn-leach (DRF-26B) (µg):	63.01	66.18	65.94	67.21		
Total leached (µg):	298.13	142.05	129.63	138.87		
Al outside SiC (µg/compact):	**59.63**	**28.41**	**25.93**	**27.77**	**35.43**	**16.16**
Titanium						
Deconsolidation-leach (DRF-26A) (µg):	6.75	9.00	6.76	9.90		
Burn-leach (DRF-26B) (µg):	7.42	5.70	8.12	5.82		
Total leached (µg):	14.17	14.70	14.88	15.72		
Ti outside SiC (µg/compact):	**2.83**	**2.94**	**2.98**	**3.14**	**2.97**	**0.13**
Vanadium						
Deconsolidation-leach (DRF-26A) (µg):	38.05	44.71	37.05	41.40		
Burn-leach (DRF-26B) (µg):	48.96	50.11	46.19	46.00		
Total leached (µg):	87.01	94.82	83.24	87.40		
V outside SiC (µg/compact):	**17.40**	**18.96**	**16.65**	**17.48**	**17.62**	**0.97**
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):	**20.24**	**21.90**	**19.62**	**20.62**	**20.60**	**0.96**



QC Supervisor

12-8-09

Date

Inspection Report Form IRF-12B: Summary of Impurites Outside SiC - Maximum Corrected Values

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	055, 030, 085, 108, 140	026, 103, 095, 119, 077	112, 009, 155, 056, 001	144, 134, 051, 115, 088	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Deconsolidation-leach (DRF-26A) (µg):	10.44	10.79	10.67	10.51		
Burn-leach (DRF-26B) (µg):	5.65	5.97	6.63	5.76		
Total leached (µg):	16.09	16.76	17.30	16.26		
Fe outside SiC (µg/compact):	**3.22**	**3.35**	**3.46**	**3.25**	**3.32**	**0.11**
Chromium						
Deconsolidation-leach (DRF-26A) (µg):	2.33	2.11	1.86	1.90		
Burn-leach (DRF-26B) (µg):	0.72	0.78	0.86	0.70		
Total leached (µg):	3.04	2.89	2.72	2.60		
Cr outside SiC (µg/compact):	**0.61**	**0.58**	**0.54**	**0.52**	**0.56**	**0.04**
Manganese						
Deconsolidation-leach (DRF-26A) (µg):	0.49	0.50	0.49	0.49		
Burn-leach (DRF-26B) (µg):	0.19	0.19	0.20	0.19		
Total leached (µg):	0.68	0.69	0.69	0.68		
Mn outside SiC (µg/compact):	**0.14**	**0.14**	**0.14**	**0.14**	**0.137**	**0.001**
Cobalt						
Deconsolidation-leach (DRF-26A) (µg):	0.41	0.42	0.42	0.41		
Burn-leach (DRF-26B) (µg):	0.16	0.16	0.17	0.16		
Total leached (µg):	0.57	0.59	0.59	0.58		
Co outside SiC (µg/compact):	**0.11**	**0.12**	**0.12**	**0.12**	**0.116**	**0.001**
Nickel						
Deconsolidation-leach (DRF-26A) (µg):	2.02	2.10	2.07	2.04		
Burn-leach (DRF-26B) (µg):	1.11	0.93	0.90	0.85		
Total leached (µg):	3.13	3.02	2.97	2.89		
Ni outside SiC (µg/compact):	**0.63**	**0.60**	**0.59**	**0.58**	**0.60**	**0.02**
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):	**1.49**	**1.44**	**1.39**	**1.35**	**1.42**	**0.06**
Calcium						
Deconsolidation-leach (DRF-26A) (µg):	45.30	39.18	49.14	25.50		
Burn-leach (DRF-26B) (µg):	109.74	116.39	90.73	115.81		
Total leached (µg):	155.04	155.57	139.87	141.31		
Ca outside SiC (µg/compact):	**31.01**	**31.11**	**27.97**	**28.26**	**29.59**	**1.70**
Aluminum						
Deconsolidation-leach (DRF-26A) (µg):	71.17	64.86	56.07	63.95		
Burn-leach (DRF-26B) (µg):	60.71	74.56	62.78	57.00		
Total leached (µg):	131.89	139.42	118.85	120.96		
Al outside SiC (µg/compact):	**26.38**	**27.88**	**23.77**	**24.19**	**25.56**	**1.93**
Titanium						
Deconsolidation-leach (DRF-26A) (µg):	7.65	7.17	5.31	6.62		
Burn-leach (DRF-26B) (µg):	7.95	8.20	9.06	8.23		
Total leached (µg):	15.60	15.37	14.37	14.85		
Ti outside SiC (µg/compact):	**3.12**	**3.07**	**2.87**	**2.97**	**3.01**	**0.11**
Vanadium						
Deconsolidation-leach (DRF-26A) (µg):	42.77	42.07	39.93	38.82		
Burn-leach (DRF-26B) (µg):	49.25	55.51	52.53	43.79		
Total leached (µg):	92.02	97.58	92.46	82.61		
V outside SiC (µg/compact):	**18.40**	**19.52**	**18.49**	**16.52**	**18.23**	**1.25**
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):	**21.52**	**22.59**	**21.37**	**19.49**	**21.24**	**1.29**

John Klumm — QC Supervisor

12-8-09 — Date

Inspection Report Form IRF-12B: Summary of Impurites Outside SiC - Maximum Corrected Values

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	142, 047, 011, 092, 038	069, 050, 039, 150, 028	114, 133, 127, 091, 061	099, 024, 031, 104, 101	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Deconsolidation-leach (DRF-26A) (µg):	11.58	11.17	11.49	11.33		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Fe outside SiC (µg/compact):						
Chromium						
Deconsolidation-leach (DRF-26A) (µg):	1.53	0.99	1.20	1.16		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Cr outside SiC (µg/compact):						
Manganese						
Deconsolidation-leach (DRF-26A) (µg):	0.54	0.52	0.53	0.53		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Mn outside SiC (µg/compact):						
Cobalt						
Deconsolidation-leach (DRF-26A) (µg):	0.46	0.44	0.45	0.45		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Co outside SiC (µg/compact):						
Nickel						
Deconsolidation-leach (DRF-26A) (µg):	2.25	2.17	2.23	2.20		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Ni outside SiC (µg/compact):						
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):						
Calcium						
Deconsolidation-leach (DRF-26A) (µg):	12.60	13.00	38.38	12.60		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Ca outside SiC (µg/compact):						
Aluminum						
Deconsolidation-leach (DRF-26A) (µg):	69.28	62.29	72.61	67.33		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Al outside SiC (µg/compact):						
Titanium						
Deconsolidation-leach (DRF-26A) (µg):	7.89	4.15	7.78	5.10		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
Ti outside SiC (µg/compact):						
Vanadium						
Deconsolidation-leach (DRF-26A) (µg):	38.23	36.52	39.57	41.64		
Burn-leach (DRF-26B) (µg):						
Total leached (µg):						
V outside SiC (µg/compact):						
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):						

John Hunn
QC Supervisor

12-8-09
Date

Inspection Report Form IRF-12C: Summary of Uranium Contamination

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	060, 046, 122, 146, 130	141, 138, 111, 064, 053	023, 076, 006, 040, 034	139, 083, 087, 145, 049	Total
Number of compacts:	5	5	5	5	20
Effective number of exposed kernels:	1.1	1.1	0.0	0.6	2.8

QC Supervisor

12-8-09

Date

Inspection Report Form IRF-12C: Summary of Uranium Contamination

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	123, 147, 152, 035, 010	110, 045, 042, 002, 086	136, 078, 052, 070, 059	033, 044, 124, 075, 032	Total
Number of compacts:	5	5	5	5	20
Effective number of exposed kernels:	0.0	2.0	1.1	0.2	3.3

John Henry

QC Supervisor

12-8-09

Date

Inspection Report Form IRF-12C: Summary of Uranium Contamination

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	005, 013, 107, 058, 062	135, 017, 022, 018, 125	037, 027, 097, 025, 048	129, 149, 100, 029, 066	Total
Number of compacts:	5	5	5	5	20
Effective number of exposed kernels:	2.0	0.0	0.0	1.0	3.1

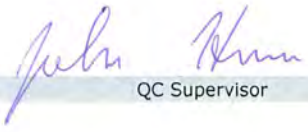
John Hunn — QC Supervisor

12-8-09 — Date

Inspection Report Form IRF-12C: Summary of Uranium Contamination

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	055, 030, 085, 108, 140	026, 103, 095, 119, 077	112, 009, 155, 056, 001	144, 134, 051, 115, 088	Total
Number of compacts:	5	5	5	5	20
Effective number of exposed kernels:	1.1	1.1	0.0	0.0	2.2



QC Supervisor

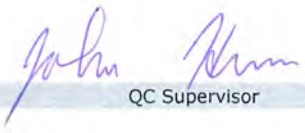
12-8-09

Date

Inspection Report Form IRF-12C: Summary of Uranium Contamination

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	142, 047, 011, 092, 038	069, 050, 039, 150, 028	114, 133, 127, 091, 061	099, 024, 031, 104, 101	Total
Number of compacts:	5	5	5	5	20
Effective number of exposed kernels:	0.0	0.0	2.3	1.0	3.3



QC Supervisor

12-8-09

Date

Inspection Report Form IRF-12D: Summary of Burn Leach Defects

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	060, 046, 122, 146, 130	141, 138, 111, 064, 053	023, 076, 006, 040, 034	139, 083, 087, 145, 049	Total
Number of compacts:	5	5	5	5	20
Number of leached kernels:	0	0	0	0	0

John Hunn
QC Supervisor

12-8-09
Date

Inspection Report Form IRF-12D: Summary of Burn Leach Defects

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	005, 013, 107, 058, 062	135, 017, 022, 018, 125	037, 027, 097, 025, 048	129, 149, 100, 029, 066	Total
Number of compacts:	5	5	5	5	20
Number of leached kernels:	0	0	0	0	0

John Kim
QC Supervisor

12-8-09
Date

Inspection Report Form IRF-12D: Summary of Burn Leach Defects

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A

Compact ID numbers:	055, 030, 085, 108, 140	026, 103, 095, 119, 077	112, 009, 155, 056, 001	144, 134, 051, 115, 088	Total
Number of compacts:	5	5	5	5	20
Number of leached kernels:	0	0	0	0	0

John Klumm — QC Supervisor

12-8-09 — Date

Data Report Form DRF-24A: Compact Diameter and Length

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Vertical height gauge calibration due date:	3/6/10
Pass-thru block calibration due date:	1/17/11
Digital caliper calibration due date:	7/22/09
Gauge blocks calibration due date:	11/7/12
Analytical balance calibration due date:	2/12/10

Acceptance criteria for compact length:	≥25.02 and ≤25.40 mm
Acceptance criteria for compact diameter:	≥12.22 and ≤12.46 mm (and pass through 12.46 mm ring gauge)
Acceptance criteria for compact mass:	For information only

Compact ID Number	Length (mm)	Diameter (mm)						Pass Thru? (Y or N)	Compact weight (g)	Accept? (pass or fail)
		Top 1	Top 2	Middle 1	Middle 2	Bottom 1	Bottom 2			
Z001	25.242	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3449	pass
Z002	25.284	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3501	pass
Z003	25.159	12.31	12.31	12.32	12.32	12.32	12.32	Y	6.3504	pass
Z004	25.124	12.31	12.30	12.32	12.32	12.31	12.31	Y	6.3500	pass
Z005	25.218	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3466	pass
Z006	25.225	12.31	12.31	12.33	12.32	12.32	12.32	Y	6.3508	pass
Z007	25.242	12.31	12.31	12.32	12.32	12.31	12.32	Y	6.3453	pass
Z008	25.197	12.32	12.33	12.33	12.34	12.33	12.33	Y	6.3609	pass
Z009	25.165	12.30	12.31	12.32	12.32	12.31	12.31	Y	6.3542	pass
Z010	25.204	12.31	12.31	12.32	12.32	12.31	12.30	Y	6.3419	pass
Z011	25.144	12.31	12.31	12.32	12.32	12.30	12.30	Y	6.3376	pass
Z012	25.358	12.31	12.30	12.31	12.31	12.30	12.31	Y	6.3532	pass
Z013	25.217	12.30	12.30	12.32	12.32	12.31	12.31	Y	6.3393	pass
Z014	25.212	12.30	12.31	12.32	12.32	12.31	12.31	Y	6.3355	pass
Z015	25.352	12.32	12.32	12.33	12.33	12.31	12.31	Y	6.3399	pass
Z016	25.232	12.32	12.31	12.33	12.33	12.31	12.31	Y	6.3613	pass
Z017	25.063	12.31	12.31	12.32	12.31	12.30	12.30	Y	6.3530	pass
Z018	25.172	12.31	12.31	12.32	12.31	12.30	12.30	Y	6.3494	pass
Z019	25.215	12.31	12.30	12.32	12.32	12.30	12.30	Y	6.3473	pass
Z020	25.232	12.31	12.31	12.33	12.33	12.31	12.31	Y	6.3604	pass
Z021	25.073	12.31	12.30	12.31	12.32	12.30	12.31	Y	6.3369	pass
Z022	25.222	12.31	12.31	12.32	12.32	12.30	12.30	Y	6.3438	pass
Z023	25.152	12.30	12.31	12.32	12.32	12.30	12.30	Y	6.3443	pass
Z024	25.151	12.31	12.30	12.32	12.32	12.30	12.31	Y	6.3502	pass
Z025	25.112	12.31	12.31	12.32	12.31	12.32	12.32	Y	6.3495	pass
Z026	25.196	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3415	pass
Z027	25.233	12.31	12.30	12.32	12.32	12.31	12.31	Y	6.3492	pass
Z028	25.134	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3530	pass
Z029	25.093	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.3447	pass
Z030	25.156	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.3453	pass
Z031	25.134	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.3499	pass
Z032	25.201	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3590	pass
Z033	25.093	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3267	pass
Z034	25.221	12.32	12.32	12.32	12.32	12.31	12.32	Y	6.3420	pass
Z035	25.303	12.30	12.30	12.32	12.32	12.30	12.30	Y	6.3611	pass
Z036	25.224	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.3464	pass
Z037	25.134	12.30	12.30	12.31	12.32	12.31	12.30	Y	6.3399	pass
Z038	25.132	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3407	pass
Z039	25.185	12.31	12.31	12.32	12.33	12.32	12.31	Y	6.3449	pass
Z040	25.204	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.3496	pass

Comments

Operator

4-17-09

Date

QC Supervisor

7-6-09

Date

QA Reviewer

12/8/09

Date

Data Report Form DRF-24A: Compact Diameter and Length

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Vertical height gauge calibration due date:	3/6/10
Pass-thru block calibration due date:	1/17/11
Digital caliper calibration due date:	7/22/09
Gauge blocks calibration due date:	11/7/12
Analytical balance calibration due date:	2/12/10

Acceptance criteria for compact length:	≥25.02 and ≤25.40 mm
Acceptance criteria for compact diameter:	≥12.22 and ≤12.46 mm (and pass through 12.46 mm ring gauge)
Acceptance criteria for compact mass:	For information only

Compact ID Number	Length (mm)	Diameter (mm)						Pass Thru? (Y or N)	Compact weight (g)	Accept? (pass or fail)
		Top 1	Top 2	Middle 1	Middle 2	Bottom 1	Bottom 2			
Z041	25.121	12.31	12.30	12.31	12.31	12.31	12.30	Y	6.3464	pass
Z042	25.226	12.31	12.31	12.32	12.33	12.32	12.31	Y	6.3584	pass
Z043	25.063	12.31	12.30	12.32	12.31	12.31	12.31	Y	6.3437	pass
Z044	25.091	12.30	12.31	12.31	12.32	12.30	12.30	Y	6.3397	pass
Z045	25.163	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3478	pass
Z046	25.076	12.30	12.30	12.32	12.32	12.30	12.30	Y	6.3524	pass
Z047	25.205	12.31	12.32	12.32	12.32	12.32	12.32	Y	6.3480	pass
Z048	25.120	12.32	12.31	12.32	12.32	12.31	12.32	Y	6.3350	pass
Z049	25.245	12.31	12.31	12.32	12.32	12.30	12.31	Y	6.3393	pass
Z050	25.134	12.31	12.32	12.34	12.34	12.31	12.32	Y	6.3517	pass
Z051	25.201	12.31	12.32	12.32	12.32	12.30	12.31	Y	6.3400	pass
Z052	25.234	12.31	12.32	12.32	12.33	12.32	12.32	Y	6.3528	pass
Z053	25.273	12.30	12.31	12.32	12.33	12.31	12.31	Y	6.3563	pass
Z054	25.157	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3552	pass
Z055	25.062	12.31	12.32	12.31	12.32	12.32	12.31	Y	6.3535	pass
Z056	25.241	12.31	12.31	12.32	12.32	12.31	12.32	Y	6.3569	pass
Z057	25.242	12.31	12.30	12.31	12.31	12.30	12.31	Y	6.3532	pass
Z058	25.174	12.32	12.31	12.32	12.31	12.32	12.31	Y	6.3426	pass
Z059	25.030	12.30	12.30	12.31	12.31	12.31	12.30	Y	6.3389	pass
Z060	25.267	12.32	12.32	12.33	12.33	12.33	12.32	Y	6.3550	pass
Z061	25.336	12.33	12.32	12.33	12.33	12.33	12.32	Y	6.3425	pass
Z062	25.218	12.31	12.32	12.32	12.32	12.30	12.31	Y	6.3434	pass
Z063	25.095	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3432	pass
Z064	25.131	12.32	12.32	12.32	12.32	12.31	12.31	Y	6.3355	pass
Z065	25.288	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3456	pass
Z066	25.134	12.33	12.32	12.33	12.33	12.32	12.32	Y	6.3521	pass
Z067	25.212	12.31	12.32	12.33	12.33	12.31	12.32	Y	6.3400	pass
Z068	25.165	12.31	12.31	12.32	12.32	12.32	12.32	Y	6.3575	pass
Z069	25.214	12.32	12.32	12.33	12.33	12.31	12.31	Y	6.3450	pass
Z070	25.177	12.31	12.31	12.33	12.33	12.31	12.31	Y	6.3416	pass
Z071	25.215	12.32	12.32	12.32	12.33	12.32	12.31	Y	6.3573	pass
Z072	25.152	12.31	12.31	12.32	12.32	12.30	12.30	Y	6.3374	pass
Z073	25.246	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3604	pass
Z074	25.134	12.32	12.31	12.32	12.32	12.31	12.31	Y	6.3449	pass
Z075	25.234	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3514	pass
Z076	25.251	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3512	pass
Z077	25.143	12.32	12.32	12.32	12.33	12.31	12.31	Y	6.3576	pass
Z078	25.234	12.31	12.31	12.32	12.32	12.31	12.32	Y	6.3293	pass
Z079	25.315	12.31	12.30	12.32	12.32	12.32	12.32	Y	6.3491	pass
Z080	25.161	12.32	12.31	12.32	12.32	12.30	12.31	Y	6.3478	pass

Comments

Operator

4-17-09
Date

QC Supervisor

7-6-09
Date

QA Reviewer

12/8/09
Date

Data Report Form DRF-24A: Compact Diameter and Length

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Vertical height gauge calibration due date:	3/6/10
Pass-thru block calibration due date:	1/17/11
Digital caliper calibration due date:	7/22/09
Gauge blocks calibration due date:	11/7/12
Analytical balance calibration due date:	2/12/10

Acceptance criteria for compact length:	≥25.02 and ≤25.40 mm
Acceptance criteria for compact diameter:	≥12.22 and ≤12.46 mm (and pass through 12.46 mm ring gauge)
Acceptance criteria for compact mass:	For information only

Compact ID Number	Length (mm)	Diameter (mm)						Pass Thru? (Y or N)	Compact weight (g)	Accept? (pass or fail)
		Top 1	Top 2	Middle 1	Middle 2	Bottom 1	Bottom 2			
Z081	25.083	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3519	pass
Z082	25.078	12.31	12.32	12.31	12.32	12.31	12.30	Y	6.3452	pass
Z083	25.155	12.31	12.32	12.32	12.32	12.31	12.31	Y	6.3436	pass
Z084	25.219	12.32	12.32	12.33	12.33	12.32	12.31	Y	6.3638	pass
Z085	25.196	12.32	12.30	12.33	12.32	12.31	12.31	Y	6.3373	pass
Z086	25.219	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3558	pass
Z087	25.340	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3544	pass
Z088	25.236	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3484	pass
Z089	25.223	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3548	pass
Z090	25.181	12.31	12.31	12.32	12.31	12.31	12.30	Y	6.3432	pass
Z091	25.115	12.32	12.32	12.33	12.33	12.32	12.31	Y	6.3576	pass
Z092	25.147	12.30	12.30	12.32	12.32	12.30	12.31	Y	6.3390	pass
Z093	25.163	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3559	pass
Z094	25.135	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3409	pass
Z095	25.233	12.31	12.31	12.33	12.33	12.32	12.32	Y	6.3616	pass
Z096	25.252	12.31	12.31	12.32	12.32	12.30	12.31	Y	6.3530	pass
Z097	25.185	12.31	12.31	12.32	12.33	12.32	12.31	Y	6.3451	pass
Z098	25.195	12.32	12.31	12.33	12.33	12.32	12.32	Y	6.3492	pass
Z099	25.206	12.32	12.31	12.33	12.32	12.30	12.31	Y	6.3549	pass
Z100	25.142	12.31	12.31	12.33	12.32	12.32	12.31	Y	6.3409	pass
Z101	25.146	12.30	12.30	12.32	12.32	12.30	12.31	Y	6.3309	pass
Z102	25.336	12.31	12.31	12.33	12.33	12.32	12.31	Y	6.3570	pass
Z103	25.195	12.32	12.32	12.33	12.33	12.33	12.32	Y	6.3386	pass
Z104	25.077	12.30	12.31	12.32	12.32	12.30	12.30	Y	6.3266	pass
Z105	25.133	12.30	12.30	12.32	12.32	12.31	12.31	Y	6.3386	pass
Z106	25.184	12.30	12.31	12.32	12.33	12.30	12.31	Y	6.3277	pass
Z107	25.175	12.31	12.31	12.33	12.33	12.31	12.32	Y	6.3457	pass
Z108	25.151	12.31	12.31	12.33	12.33	12.32	12.32	Y	6.3570	pass
Z109	25.194	12.32	12.32	12.34	12.33	12.32	12.31	Y	6.3308	pass
Z110	25.032	12.31	12.31	12.32	12.33	12.31	12.31	Y	6.3430	pass
Z111	25.238	12.31	12.32	12.32	12.33	12.31	12.31	Y	6.3402	pass
Z112	25.217	12.30	12.30	12.32	12.32	12.30	12.31	Y	6.3430	pass
Z113	25.177	12.30	12.30	12.32	12.31	12.30	12.31	Y	6.3466	pass
Z114	25.142	12.31	12.30	12.32	12.31	12.30	12.31	Y	6.3289	pass
Z115	25.192	12.31	12.32	12.32	12.32	12.31	12.31	Y	6.3347	pass
Z116	25.278	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3665	pass
Z117	25.135	12.30	12.30	12.32	12.32	12.31	12.31	Y	6.3332	pass
Z118	25.228	12.30	12.31	12.32	12.32	12.31	12.31	Y	6.3454	pass
Z119	25.112	12.32	12.31	12.32	12.32	12.30	12.30	Y	6.3501	pass
Z120	25.298	12.32	12.31	12.32	12.32	12.30	12.31	Y	6.3380	pass

Comments

Operator — 4-17-09 Date

QC Supervisor — 7-6-09 Date

QA Reviewer — 12/8/09 Date

Data Report Form DRF-24A: Compact Diameter and Length

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Vertical height gauge calibration due date:	3/6/10
Pass-thru block calibration due date:	1/17/11
Digital caliper calibration due date:	7/22/09
Gauge blocks calibration due date:	11/7/12
Analytical balance calibration due date:	2/12/10

Acceptance criteria for compact length:	≥25.02 and ≤25.40 mm
Acceptance criteria for compact diameter:	≥12.22 and ≤12.46 mm (and pass through 12.46 mm ring gauge)
Acceptance criteria for compact mass:	For information only

Compact ID Number	Length (mm)	Diameter (mm)						Pass Thru? (Y or N)	Compact weight (g)	Accept? (pass or fail)
		Top 1	Top 2	Middle 1	Middle 2	Bottom 1	Bottom 2			
Z121	25.198	12.30	12.31	12.32	12.32	12.30	12.30	Y	6.3425	pass
Z122	25.212	12.30	12.31	12.32	12.32	12.31	12.32	Y	6.3314	pass
Z123	25.446	12.32	12.32	12.33	12.33	12.31	12.31	Y	6.3512	fail
Z124	25.223	12.31	12.31	12.32	12.32	12.32	12.31	Y	6.3547	pass
Z125	25.217	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3364	pass
Z126	25.236	12.32	12.32	12.33	12.32	12.31	12.31	Y	6.3511	pass
Z127	25.178	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3486	pass
Z128	25.133	12.31	12.31	12.33	12.32	12.31	12.32	Y	6.3375	pass
Z129	25.215	12.32	12.31	12.34	12.33	12.32	12.32	Y	6.3397	pass
Z130	25.034	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3357	pass
Z131	25.172	12.34	12.34	12.34	12.34	12.32	12.33	Y	6.3512	pass
Z132	25.270	12.33	12.32	12.33	12.33	12.32	12.32	Y	6.3389	pass
Z133	25.214	12.32	12.31	12.33	12.33	12.32	12.32	Y	6.3505	pass
Z134	25.280	12.32	12.32	12.34	12.34	12.33	12.33	Y	6.3431	pass
Z135	25.155	12.32	12.31	12.32	12.32	12.32	12.31	Y	6.3369	pass
Z136	25.146	12.32	12.32	12.32	12.32	12.32	12.32	Y	6.3447	pass
Z137	25.218	12.33	12.33	12.34	12.34	12.34	12.33	Y	6.3539	pass
Z138	25.121	12.31	12.31	12.31	12.31	12.30	12.30	Y	6.3414	pass
Z139	25.213	12.32	12.32	12.33	12.33	12.31	12.31	Y	6.3589	pass
Z140	25.312	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3557	pass
Z141	25.126	12.30	12.31	12.31	12.32	12.30	12.30	Y	6.3407	pass
Z142	25.115	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3375	pass
Z143	25.204	12.33	12.33	12.34	12.34	12.32	12.33	Y	6.3528	pass
Z144	25.088	12.32	12.32	12.33	12.33	12.32	12.31	Y	6.3520	pass
Z145	25.154	12.31	12.31	12.32	12.32	12.31	12.31	Y	6.3434	pass
Z146	25.091	12.30	12.30	12.32	12.32	12.31	12.31	Y	6.3450	pass
Z147	25.194	12.33	12.33	12.34	12.34	12.33	12.32	Y	6.3492	pass
Z148	25.323	12.31	12.32	12.33	12.33	12.31	12.32	Y	6.3374	pass
Z149	25.260	12.33	12.33	12.33	12.33	12.32	12.33	Y	6.3448	pass
Z150	25.203	12.33	12.32	12.33	12.33	12.33	12.32	Y	6.3491	pass
Z151	25.186	12.32	12.32	12.33	12.33	12.32	12.32	Y	6.3405	pass
Z152	25.215	12.31	12.31	12.32	12.33	12.31	12.31	Y	6.3460	pass
Z153	25.142	12.31	12.31	12.32	12.32	12.31	12.30	Y	6.3440	pass
Z154	25.161	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.3476	pass
Z155	25.088	12.32	12.31	12.32	12.32	12.32	12.33	Y	6.3344	pass
Z156										
Z157										
Z158										
Z159										
Z160										

Comments
Compact LEU07-OP1-Z123 was 0.046 mm over the upper limit on compact length; this compact was used for LBL analysis.

Operator — Date: 4-17-09

QC Supervisor — Date: 7-6-09

QA Reviewer — Date: 12/8/09

Data Report Form DRF-24B: Compact Matrix Density

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Average weight per TRISO particle (g):	1.004E-03
Average weight per overcoated particle (g):	2.018E-03
Average TRISO particle volume (cm3):	3.290E-04

Acceptance criteria for matrix density:	≥1.45

Compact ID Number	Compact Weight (g)	Length (mm)	Av. Diameter (mm)	Compact Volume (cm3)	Charge Weight (g)	Particle Weight (g)	Particle Volume (cm3)	Packing Fraction	Matrix Density (g/cm3)	Accept? (pass or fail)
Z001	6.3449	25.242	12.31	3.01	6.4589	3.2138	1.05	35%	1.60	pass
Z002	6.3501	25.284	12.31	3.01	6.4584	3.2128	1.05	35%	1.60	pass
Z003	6.3504	25.159	12.32	3.00	6.4589	3.2138	1.05	35%	1.61	pass
Z004	6.3500	25.124	12.31	2.99	6.4582	3.2128	1.05	35%	1.62	pass
Z005	6.3466	25.218	12.31	3.00	6.4576	3.2128	1.05	35%	1.61	pass
Z006	6.3508	25.225	12.32	3.01	6.4587	3.2138	1.05	35%	1.61	pass
Z007	6.3453	25.242	12.32	3.01	6.4582	3.2128	1.05	35%	1.60	pass
Z008	6.3609	25.197	12.33	3.01	6.4585	3.2128	1.05	35%	1.61	pass
Z009	6.3542	25.165	12.31	3.00	6.4583	3.2128	1.05	35%	1.62	pass
Z010	6.3419	25.204	12.31	3.00	6.4596	3.2138	1.05	35%	1.61	pass
Z011	6.3376	25.144	12.31	2.99	6.4575	3.2128	1.05	35%	1.61	pass
Z012	6.3532	25.358	12.31	3.02	6.4587	3.2138	1.05	35%	1.60	pass
Z013	6.3393	25.217	12.31	3.00	6.4572	3.2128	1.05	35%	1.60	pass
Z014	6.3355	25.212	12.31	3.00	6.4586	3.2128	1.05	35%	1.60	pass
Z015	6.3399	25.352	12.32	3.02	6.4568	3.2128	1.05	35%	1.59	pass
Z016	6.3613	25.232	12.32	3.01	6.4583	3.2128	1.05	35%	1.61	pass
Z017	6.3530	25.063	12.31	2.98	6.4592	3.2138	1.05	35%	1.63	pass
Z018	6.3494	25.172	12.31	3.00	6.4568	3.2128	1.05	35%	1.61	pass
Z019	6.3473	25.215	12.31	3.00	6.4592	3.2138	1.05	35%	1.61	pass
Z020	6.3604	25.232	12.32	3.01	6.4575	3.2128	1.05	35%	1.61	pass
Z021	6.3369	25.073	12.31	2.98	6.4569	3.2128	1.05	35%	1.62	pass
Z022	6.3438	25.222	12.31	3.00	6.4594	3.2138	1.05	35%	1.61	pass
Z023	6.3443	25.152	12.31	2.99	6.4568	3.2128	1.05	35%	1.61	pass
Z024	6.3502	25.151	12.31	2.99	6.4570	3.2128	1.05	35%	1.62	pass
Z025	6.3495	25.112	12.32	2.99	6.4573	3.2128	1.05	35%	1.62	pass
Z026	6.3415	25.196	12.31	3.00	6.4583	3.2128	1.05	35%	1.61	pass
Z027	6.3492	25.233	12.31	3.00	6.4593	3.2138	1.05	35%	1.61	pass
Z028	6.3530	25.134	12.31	2.99	6.4587	3.2138	1.05	35%	1.62	pass
Z029	6.3447	25.093	12.30	2.98	6.4580	3.2128	1.05	35%	1.62	pass
Z030	6.3453	25.156	12.30	2.99	6.4574	3.2128	1.05	35%	1.62	pass
Z031	6.3499	25.134	12.30	2.99	6.4580	3.2128	1.05	35%	1.62	pass
Z032	6.3590	25.201	12.32	3.01	6.4588	3.2138	1.05	35%	1.61	pass
Z033	6.3267	25.093	12.31	2.99	6.4577	3.2128	1.05	35%	1.61	pass
Z034	6.3420	25.221	12.32	3.01	6.4579	3.2128	1.05	35%	1.60	pass
Z035	6.3611	25.303	12.31	3.01	6.4580	3.2128	1.05	35%	1.61	pass
Z036	6.3464	25.224	12.30	3.00	6.4575	3.2128	1.05	35%	1.61	pass
Z037	6.3399	25.134	12.31	2.99	6.4593	3.2138	1.05	35%	1.61	pass
Z038	6.3407	25.132	12.31	2.99	6.4592	3.2138	1.05	35%	1.61	pass
Z039	6.3449	25.185	12.32	3.00	6.4569	3.2128	1.05	35%	1.61	pass
Z040	6.3496	25.204	12.30	3.00	6.4572	3.2128	1.05	35%	1.61	pass

Comments

Particle weight from combined results of 2 independent measurements (W09010801 and W09011403).

Operator — Date: 4-17-09

QC Supervisor — Date: 7-6-09

QA Reviewer — Date: 12/8/09

Data Report Form DRF-24B: Compact Matrix Density

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Average weight per TRISO particle (g):	1.004E-03
Average weight per overcoated particle (g):	2.018E-03
Average TRISO particle volume (cm3):	3.290E-04

Acceptance criteria for matrix density:	≥1.45

Compact ID Number	Compact Weight (g)	Length (mm)	Av. Diameter (mm)	Compact Volume (cm3)	Charge Weight (g)	Particle Weight (g)	Particle Volume (cm3)	Packing Fraction	Matrix Density (g/cm3)	Accept? (pass or fail)
Z041	6.3464	25.121	12.31	2.99	6.4576	3.2128	1.05	35%	1.62	pass
Z042	6.3584	25.226	12.32	3.01	6.4564	3.2118	1.05	35%	1.61	pass
Z043	6.3437	25.063	12.31	2.98	6.4593	3.2138	1.05	35%	1.62	pass
Z044	6.3397	25.091	12.31	2.98	6.4595	3.2138	1.05	35%	1.62	pass
Z045	6.3478	25.163	12.31	3.00	6.4594	3.2138	1.05	35%	1.61	pass
Z046	6.3524	25.076	12.31	2.98	6.4577	3.2128	1.05	35%	1.63	pass
Z047	6.3480	25.205	12.32	3.00	6.4572	3.2128	1.05	35%	1.61	pass
Z048	6.3350	25.120	12.32	2.99	6.4583	3.2128	1.05	35%	1.61	pass
Z049	6.3393	25.245	12.31	3.01	6.4585	3.2128	1.05	35%	1.60	pass
Z050	6.3517	25.134	12.32	3.00	6.4590	3.2138	1.05	35%	1.61	pass
Z051	6.3400	25.201	12.31	3.00	6.4579	3.2128	1.05	35%	1.61	pass
Z052	6.3528	25.234	12.32	3.01	6.4574	3.2128	1.05	35%	1.61	pass
Z053	6.3563	25.273	12.31	3.01	6.4597	3.2138	1.05	35%	1.61	pass
Z054	6.3552	25.157	12.32	3.00	6.4580	3.2128	1.05	35%	1.61	pass
Z055	6.3535	25.062	12.32	2.99	6.4581	3.2128	1.05	35%	1.63	pass
Z056	6.3569	25.241	12.32	3.01	6.4589	3.2138	1.05	35%	1.61	pass
Z057	6.3532	25.242	12.31	3.00	6.4575	3.2128	1.05	35%	1.61	pass
Z058	6.3426	25.174	12.32	3.00	6.4591	3.2138	1.05	35%	1.61	pass
Z059	6.3389	25.030	12.31	2.98	6.4583	3.2128	1.05	35%	1.62	pass
Z060	6.3550	25.267	12.33	3.01	6.4583	3.2128	1.05	35%	1.60	pass
Z061	6.3425	25.336	12.33	3.02	6.4581	3.2128	1.05	35%	1.59	pass
Z062	6.3434	25.218	12.31	3.00	6.4575	3.2128	1.05	35%	1.61	pass
Z063	6.3432	25.095	12.32	2.99	6.4593	3.2138	1.05	35%	1.61	pass
Z064	6.3355	25.131	12.32	2.99	6.4579	3.2128	1.05	35%	1.61	pass
Z065	6.3456	25.288	12.32	3.02	6.4586	3.2128	1.05	35%	1.60	pass
Z066	6.3521	25.134	12.33	3.00	6.4591	3.2138	1.05	35%	1.61	pass
Z067	6.3400	25.212	12.32	3.01	6.4585	3.2128	1.05	35%	1.60	pass
Z068	6.3575	25.165	12.32	3.00	6.4587	3.2138	1.05	35%	1.62	pass
Z069	6.3450	25.214	12.32	3.01	6.4582	3.2128	1.05	35%	1.60	pass
Z070	6.3416	25.177	12.32	3.00	6.4572	3.2128	1.05	35%	1.61	pass
Z071	6.3573	25.215	12.32	3.01	6.4591	3.2138	1.05	35%	1.61	pass
Z072	6.3374	25.152	12.31	2.99	6.4590	3.2138	1.05	35%	1.61	pass
Z073	6.3604	25.246	12.32	3.01	6.4583	3.2128	1.05	35%	1.61	pass
Z074	6.3449	25.134	12.32	2.99	6.4570	3.2128	1.05	35%	1.61	pass
Z075	6.3514	25.234	12.32	3.01	6.4575	3.2128	1.05	35%	1.60	pass
Z076	6.3512	25.251	12.31	3.01	6.4581	3.2128	1.05	35%	1.61	pass
Z077	6.3576	25.143	12.32	3.00	6.4595	3.2138	1.05	35%	1.62	pass
Z078	6.3293	25.234	12.32	3.01	6.4592	3.2138	1.05	35%	1.60	pass
Z079	6.3491	25.315	12.32	3.02	6.4587	3.2138	1.05	35%	1.60	pass
Z080	6.3478	25.161	12.31	3.00	6.4597	3.2138	1.05	35%	1.61	pass

Comments

Operator	4-17-09 Date
QC Supervisor	7-6-09 Date
QA Reviewer	12/8/09 Date

Data Report Form DRF-24B: Compact Matrix Density

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Average weight per TRISO particle (g):	1.004E-03
Average weight per overcoated particle (g):	2.018E-03
Average TRISO particle volume (cm3):	3.290E-04

Acceptance criteria for matrix density:	≥1.45

Compact ID Number	Compact Weight (g)	Length (mm)	Av. Diameter (mm)	Compact Volume (cm3)	Charge Weight (g)	Particle Weight (g)	Particle Volume (cm3)	Packing Fraction	Matrix Density (g/cm3)	Accept? (pass or fail)
Z081	6.3519	25.083	12.31	2.99	6.4591	3.2138	1.05	35%	1.62	pass
Z082	6.3452	25.078	12.31	2.99	6.4583	3.2128	1.05	35%	1.62	pass
Z083	6.3436	25.155	12.32	3.00	6.4588	3.2138	1.05	35%	1.61	pass
Z084	6.3638	25.219	12.32	3.01	6.4586	3.2128	1.05	35%	1.61	pass
Z085	6.3373	25.196	12.32	3.00	6.4583	3.2128	1.05	35%	1.60	pass
Z086	6.3558	25.219	12.32	3.01	6.4568	3.2128	1.05	35%	1.61	pass
Z087	6.3544	25.340	12.32	3.02	6.4593	3.2138	1.05	35%	1.59	pass
Z088	6.3484	25.236	12.31	3.01	6.4585	3.2128	1.05	35%	1.61	pass
Z089	6.3548	25.223	12.32	3.01	6.4599	3.2138	1.05	35%	1.61	pass
Z090	6.3432	25.181	12.31	3.00	6.4574	3.2128	1.05	35%	1.61	pass
Z091	6.3576	25.115	12.32	2.99	6.4570	3.2128	1.05	35%	1.62	pass
Z092	6.3390	25.147	12.31	2.99	6.4579	3.2128	1.05	35%	1.61	pass
Z093	6.3559	25.163	12.31	3.00	6.4586	3.2128	1.05	35%	1.62	pass
Z094	6.3409	25.135	12.31	2.99	6.4578	3.2128	1.05	35%	1.61	pass
Z095	6.3616	25.233	12.32	3.01	6.4593	3.2138	1.05	35%	1.61	pass
Z096	6.3530	25.252	12.31	3.01	6.4592	3.2138	1.05	35%	1.61	pass
Z097	6.3451	25.185	12.32	3.00	6.4579	3.2128	1.05	35%	1.61	pass
Z098	6.3492	25.195	12.32	3.00	6.4577	3.2128	1.05	35%	1.61	pass
Z099	6.3549	25.206	12.32	3.00	6.4586	3.2128	1.05	35%	1.61	pass
Z100	6.3409	25.142	12.32	3.00	6.4587	3.2138	1.05	35%	1.61	pass
Z101	6.3309	25.146	12.31	2.99	6.4582	3.2128	1.05	35%	1.61	pass
Z102	6.3570	25.336	12.32	3.02	6.4582	3.2128	1.05	35%	1.60	pass
Z103	6.3386	25.195	12.33	3.01	6.4579	3.2128	1.05	35%	1.60	pass
Z104	6.3266	25.077	12.31	2.98	6.4585	3.2128	1.05	35%	1.61	pass
Z105	6.3386	25.133	12.31	2.99	6.4593	3.2138	1.05	35%	1.61	pass
Z106	6.3277	25.184	12.31	3.00	6.4590	3.2138	1.05	35%	1.60	pass
Z107	6.3457	25.175	12.32	3.00	6.4576	3.2128	1.05	35%	1.61	pass
Z108	6.3570	25.151	12.32	3.00	6.4581	3.2128	1.05	35%	1.62	pass
Z109	6.3308	25.194	12.32	3.00	6.4574	3.2128	1.05	35%	1.60	pass
Z110	6.3430	25.032	12.32	2.98	6.4582	3.2128	1.05	35%	1.62	pass
Z111	6.3402	25.238	12.32	3.01	6.4587	3.2138	1.05	35%	1.60	pass
Z112	6.3430	25.217	12.31	3.00	6.4578	3.2128	1.05	35%	1.61	pass
Z113	6.3466	25.177	12.31	2.99	6.4580	3.2128	1.05	35%	1.61	pass
Z114	6.3289	25.142	12.31	2.99	6.4589	3.2138	1.05	35%	1.61	pass
Z115	6.3347	25.192	12.32	3.00	6.4571	3.2128	1.05	35%	1.60	pass
Z116	6.3665	25.278	12.32	3.02	6.4580	3.2128	1.05	35%	1.61	pass
Z117	6.3332	25.135	12.31	2.99	6.4581	3.2128	1.05	35%	1.61	pass
Z118	6.3454	25.228	12.31	3.00	6.4575	3.2128	1.05	35%	1.61	pass
Z119	6.3501	25.112	12.31	2.99	6.4579	3.2128	1.05	35%	1.62	pass
Z120	6.3380	25.298	12.31	3.01	6.4582	3.2128	1.05	35%	1.59	pass

Comments

Operator

4-17-09
Date

QC Supervisor

7-6-09
Date

QA Reviewer

12/8/09
Date

Data Report Form DRF-24B: Compact Matrix Density

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Average weight per TRISO particle (g):	1.004E-03
Average weight per overcoated particle (g):	2.018E-03
Average TRISO particle volume (cm3):	3.290E-04

Acceptance criteria for matrix density:	≥1.45

Compact ID Number	Compact Weight (g)	Length (mm)	Av. Diameter (mm)	Compact Volume (cm3)	Charge Weight (g)	Particle Weight (g)	Particle Volume (cm3)	Packing Fraction	Matrix Density (g/cm3)	Accept? (pass or fail)
Z121	6.3425	25.198	12.31	3.00	6.4584	3.2128	1.05	35%	1.61	pass
Z122	6.3314	25.212	12.31	3.00	6.4576	3.2128	1.05	35%	1.60	pass
Z123	6.3512	25.446	12.32	3.03	6.4595	3.2138	1.05	35%	1.58	pass
Z124	6.3547	25.223	12.32	3.00	6.4580	3.2128	1.05	35%	1.61	pass
Z125	6.3364	25.217	12.31	3.00	6.4587	3.2138	1.05	35%	1.60	pass
Z126	6.3511	25.236	12.32	3.01	6.4575	3.2128	1.05	35%	1.61	pass
Z127	6.3486	25.178	12.32	3.00	6.4594	3.2138	1.05	35%	1.61	pass
Z128	6.3375	25.133	12.32	2.99	6.4577	3.2128	1.05	35%	1.61	pass
Z129	6.3397	25.215	12.32	3.01	6.4589	3.2138	1.05	35%	1.60	pass
Z130	6.3357	25.034	12.31	2.98	6.4584	3.2128	1.05	35%	1.62	pass
Z131	6.3512	25.172	12.34	3.01	6.4579	3.2128	1.05	35%	1.61	pass
Z132	6.3389	25.270	12.33	3.01	6.4581	3.2128	1.05	35%	1.59	pass
Z133	6.3505	25.214	12.32	3.01	6.4592	3.2138	1.05	35%	1.61	pass
Z134	6.3431	25.280	12.33	3.02	6.4574	3.2128	1.05	35%	1.59	pass
Z135	6.3369	25.155	12.32	3.00	6.4574	3.2128	1.05	35%	1.61	pass
Z136	6.3447	25.146	12.32	3.00	6.4579	3.2128	1.05	35%	1.61	pass
Z137	6.3539	25.218	12.34	3.01	6.4581	3.2128	1.05	35%	1.60	pass
Z138	6.3414	25.121	12.31	2.99	6.4573	3.2128	1.05	35%	1.62	pass
Z139	6.3589	25.213	12.32	3.01	6.4583	3.2128	1.05	35%	1.61	pass
Z140	6.3557	25.312	12.32	3.02	6.4576	3.2128	1.05	35%	1.60	pass
Z141	6.3407	25.126	12.31	2.99	6.4583	3.2128	1.05	35%	1.62	pass
Z142	6.3375	25.115	12.32	3.00	6.4585	3.2128	1.05	35%	1.61	pass
Z143	6.3528	25.204	12.33	3.01	6.4589	3.2138	1.05	35%	1.60	pass
Z144	6.3520	25.088	12.32	2.99	6.4572	3.2128	1.05	35%	1.62	pass
Z145	6.3434	25.154	12.31	3.00	6.4593	3.2138	1.05	35%	1.61	pass
Z146	6.3450	25.091	12.31	2.99	6.4576	3.2128	1.05	35%	1.62	pass
Z147	6.3492	25.194	12.33	3.01	6.4579	3.2128	1.05	35%	1.60	pass
Z148	6.3374	25.323	12.32	3.02	6.4587	3.2138	1.05	35%	1.59	pass
Z149	6.3448	25.260	12.33	3.02	6.4588	3.2138	1.05	35%	1.60	pass
Z150	6.3491	25.203	12.33	3.01	6.4576	3.2128	1.05	35%	1.60	pass
Z151	6.3405	25.186	12.32	3.00	6.4579	3.2128	1.05	35%	1.60	pass
Z152	6.3460	25.215	12.32	3.00	6.4573	3.2128	1.05	35%	1.61	pass
Z153	6.3440	25.142	12.31	2.99	6.4589	3.2138	1.05	35%	1.61	pass
Z154	6.3476	25.161	12.30	2.99	6.4583	3.2128	1.05	35%	1.62	pass
Z155	6.3344	25.088	12.32	2.99	6.4583	3.2128	1.05	35%	1.61	pass
Z156										
Z157										
Z158										
Z159										
Z160										

Comments

Operator

4-17-09
Date

QC Supervisor

7-6-09
Date

QA Reviewer

12/8/09
Date

Data Report Form DRF-24C: Compact Tracking

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunber
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Compact Z Number	Compact G Number
Z001	G056
Z002	G049
Z003	G147
Z004	G156
Z005	G132
Z006	G087
Z007	G136
Z008	G152
Z009	G048
Z010	G118
Z011	G010
Z012	G054
Z013	G119
Z014	G021
Z015	G012
Z016	G047
Z017	G107
Z018	G170
Z019	G043
Z020	G130
Z021	G164
Z022	G091
Z023	G161
Z024	G064
Z025	G085
Z026	G101
Z027	G150
Z028	G109
Z029	G040
Z030	G105
Z031	G097
Z032	G090
Z033	G026
Z034	G066
Z035	G044
Z036	G163
Z037	G059
Z038	G079
Z039	G067
Z040	G179

Compact Z Number	Compact G Number
Z041	G102
Z042	G157
Z043	G100
Z044	G008
Z045	G074
Z046	G103
Z047	G138
Z048	G072
Z049	G020
Z050	G149
Z051	G032
Z052	G165
Z053	G131
Z054	G083
Z055	G098
Z056	G045
Z057	G177
Z058	G146
Z059	G029
Z060	G082
Z061	G057
Z062	G060
Z063	G080
Z064	G073
Z065	G038
Z066	G076
Z067	G144
Z068	G110
Z069	G070
Z070	G078
Z071	G086
Z072	G116
Z073	G111
Z074	G051
Z075	G180
Z076	G151
Z077	G046
Z078	G031
Z079	G127
Z080	G171

Compact Z Number	Compact G Number
Z081	G104
Z082	G094
Z083	G142
Z084	G167
Z085	G115
Z086	G129
Z087	G068
Z088	G137
Z089	G140
Z090	G134
Z091	G112
Z092	G124
Z093	G106
Z094	G113
Z095	G172
Z096	G153
Z097	G071
Z098	G162
Z099	G108
Z100	G077
Z101	G033
Z102	G052
Z103	G154
Z104	G023
Z105	G037
Z106	G019
Z107	G143
Z108	G159
Z109	G025
Z110	G093
Z111	G022
Z112	G009
Z113	G062
Z114	G121
Z115	G141
Z116	G174
Z117	G122
Z118	G158
Z119	G095
Z120	G024

Compact Z Number	Compact G Number
Z121	G042
Z122	G035
Z123	G041
Z124	G173
Z125	G034
Z126	G039
Z127	G148
Z128	G123
Z129	G028
Z130	G013
Z131	G084
Z132	G099
Z133	G061
Z134	G128
Z135	G120
Z136	G178
Z137	G135
Z138	G063
Z139	G175
Z140	G053
Z141	G117
Z142	G155
Z143	G145
Z144	G092
Z145	G069
Z146	G050
Z147	G075
Z148	G125
Z149	G058
Z150	G176
Z151	G114
Z152	G166
Z153	G081
Z154	G160
Z155	G036
Z156	
Z157	
Z158	
Z159	
Z160	

Comments

Operator

4-15-09

Date

Data Report Form DRF-24D: Compact Charge Weight

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU07-OP1-Z
Compact Lot description:	AGR-2 UCO Baseline, from G73J-14-93072A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU07-OP1_DRF24R6.xls

Analytical balance calibration due date:	10/29/09

Target compact charge weight (g):	6.4580
Allowable tolerance in compact charge weight (g):	0.0020
Average weight per overcoated particle (g):	2.018E-03
Approximate number of particles per compact:	3200
Average uranium loading per particle (g):	3.930E-04
Approximate uranium loading per compact (g):	1.258

Compact G Number	Charge Weight (g)	Compact G Number	Charge Weight (g)	Compact G Number	Charge Weight (g)	Compact G Number	Charge Weight (g)
G001	6.4587	G046	6.4595	G091	6.4594	G136	6.4582
G002	6.4581	G047	6.4583	G092	6.4572	G137	6.4585
G003	6.4573	G048	6.4583	G093	6.4582	G138	6.4572
G004	6.4591	G049	6.4584	G094	6.4583	G139	6.4561
G005	6.4570	G050	6.4576	G095	6.4579	G140	6.4599
G006	6.4587	G051	6.4570	G096	6.4585	G141	6.4571
G007	6.4567	G052	6.4582	G097	6.4580	G142	6.4588
G008	6.4595	G053	6.4576	G098	6.4581	G143	6.4576
G009	6.4578	G054	6.4587	G099	6.4581	G144	6.4585
G010	6.4575	G055	6.4594	G100	6.4593	G145	6.4589
G011	6.4580	G056	6.4589	G101	6.4583	G146	6.4591
G012	6.4568	G057	6.4581	G102	6.4576	G147	6.4589
G013	6.4584	G058	6.4588	G103	6.4577	G148	6.4594
G014	6.4584	G059	6.4593	G104	6.4591	G149	6.4590
G015	6.4583	G060	6.4575	G105	6.4574	G150	6.4593
G016	6.4582	G061	6.4592	G106	6.4586	G151	6.4581
G017	6.4585	G062	6.4580	G107	6.4592	G152	6.4585
G018	6.4582	G063	6.4573	G108	6.4586	G153	6.4592
G019	6.4590	G064	6.4570	G109	6.4587	G154	6.4579
G020	6.4585	G065	6.4572	G110	6.4587	G155	6.4585
G021	6.4586	G066	6.4579	G111	6.4583	G156	6.4582
G022	6.4587	G067	6.4569	G112	6.4570	G157	6.4564
G023	6.4585	G068	6.4593	G113	6.4578	G158	6.4575
G024	6.4582	G069	6.4593	G114	6.4579	G159	6.4581
G025	6.4574	G070	6.4582	G115	6.4583	G160	6.4583
G026	6.4577	G071	6.4579	G116	6.4590	G161	6.4568
G027	6.4580	G072	6.4583	G117	6.4583	G162	6.4577
G028	6.4589	G073	6.4579	G118	6.4596	G163	6.4575
G029	6.4583	G074	6.4594	G119	6.4572	G164	6.4569
G030	6.4579	G075	6.4579	G120	6.4574	G165	6.4574
G031	6.4592	G076	6.4591	G121	6.4589	G166	6.4573
G032	6.4579	G077	6.4587	G122	6.4581	G167	6.4586
G033	6.4582	G078	6.4572	G123	6.4577	G168	6.4577
G034	6.4587	G079	6.4592	G124	6.4579	G169	6.4584
G035	6.4576	G080	6.4593	G125	6.4587	G170	6.4568
G036	6.4583	G081	6.4589	G126	6.4582	G171	6.4597
G037	6.4593	G082	6.4583	G127	6.4587	G172	6.4593
G038	6.4586	G083	6.4580	G128	6.4574	G173	6.4580
G039	6.4575	G084	6.4579	G129	6.4568	G174	6.4580
G040	6.4580	G085	6.4573	G130	6.4575	G175	6.4583
G041	6.4595	G086	6.4591	G131	6.4597	G176	6.4576
G042	6.4584	G087	6.4587	G132	6.4576	G177	6.4575
G043	6.4592	G088	6.4592	G133	6.4577	G178	6.4579
G044	6.4580	G089	6.4590	G134	6.4574	G179	6.4572
G045	6.4589	G090	6.4588	G135	6.4581	G180	6.4575

Comments

Operator	Date
	4-1-09

Data Report Form DRF-25: Fuel Compact Mean Uranium Loading

Procedure:	AGR-CHAR-DAM-25 Rev. 2
Operator:	Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline fuel, from G73J-14-93072A
Filename:	\\mc-agr\AGR\UraniumLoading\LEU07-OP1-Z_DRF25R2.xls

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
Compact ID number:	Z057	Z154	Z096	Z090	Z120	Z153
First Leach						
Sample tube ID number:	U09042001	U09042002	U09042003	U09042004	U09042005	U09042006
Radiochemical laboratory analysis number:	1874-001	1874-002	1874-003	1874-004	1874-005	1874-006
Weight U in leach (g):	1.251	1.255	1.242	1.253	1.250	1.254
Uncertainty in weight U in leach (g):	0.005	0.005	0.005	0.005	0.005	0.005
Second Leach						
Sample tube ID number:	U09042101	U09042102	U09042103	U09042104	U09042105	U09042106
Radiochemical laboratory analysis number:	1874-007	1874-008	1874-009	1874-010	1874-011	1874-012
Weight U in leach (g):	3.05E-04	2.88E-04	4.13E-04	2.94E-04	4.86E-04	3.80E-04
Uncertainty in weight U in leach (g):	3.05E-05	2.88E-05	4.13E-05	2.94E-05	4.86E-05	3.80E-05
Total Measured U						
Weight U in compact (g):	1.251	1.255	1.242	1.253	1.251	1.254
Uncertainty in weight U in compact (g):	0.005	0.005	0.005	0.005	0.005	0.005

Mean uranium loading (gU/compact):	1.251
Standard deviation in mean uranium loading (gU/compact):	0.005

Comments
Leach 1 was analyzed by Davies-Gray titration method. Leach 2 was analyzed by ICP-MS, due to low U concentration.
Davies-Gray Initial known U recovery: 100.25%; final known U recovery 100.18% Blind titration U recovery 100.39%.
Uncertainty in Davies-Gray (0.4%) based on average of measured % recovery data for LEU06,07,08,09.
wt. % U235 enrichment: sample 1 = 14.542: sample 2 = 14.529; sample 3 = 14.533; sample 4 = 14.529; sample 5 = 14.501; sample 6 = 14.504
U data check with official results of analysies for RMAL1874 by FCM on 5/26/2009

Fred C. Montgomery — Operator

10-19-2009 — Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	060, 046, 122, 146, 130
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.930E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09042401	L09042801	
	Number of compacts:	5		
	Total volume of leach solution (ml):	145.0	140.0	
	Radiochemical laboratory analysis number:	1881-001	1881-008	
	Measured uranium concentration (µg/ml):	2.82E+00	1.47E-01	
	Uncertainty in uranium concentration (µg/ml):	2.82E-01	1.47E-02	
	Weight uranium leached (g):	4.09E-04	2.06E-05	4.29E-04
	Uncertainty in weight uranium leached (g):	4.09E-05	2.06E-06	4.10E-05
	Effective number of exposed kernels:	1.0	0.1	1.1
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	< 1.03E-01	< 1.03E-01	**Fe**
	Uncorrected weight of impurity in sample (µg):	<14.94	<14.42	<29.36
	Weight of impurity in blank (µg):	<18.33	<14.11	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	14.94	14.42	29.36
Cr	Measured concentration of impurity in sample (µg/ml):	7.08E-03	5.47E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.03	0.77	1.79
	Weight of impurity in blank (µg):	< 0.89	< 0.69	
	Minimum corrected weight of impurity in sample (µg):	0.14	0.08	0.22
	Maximum corrected weight of impurity in sample (µg):	1.03	0.77	1.79
Mn	Measured concentration of impurity in sample (µg/ml):	< 4.77E-03	< 4.77E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.69	< 0.67	< 1.36
	Weight of impurity in blank (µg):	< 0.85	< 0.65	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.69	0.67	1.36
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.59	< 0.57	< 1.16
	Weight of impurity in blank (µg):	< 0.72	< 0.56	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.59	0.57	1.16
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 2.90	< 2.80	< 5.70
	Weight of impurity in blank (µg):	< 3.56	< 2.74	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.90	2.80	5.70
Ca	Measured concentration of impurity in sample (µg/ml):	4.63E-01	2.16E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	67.14	30.24	97.38
	Weight of impurity in blank (µg):	<17.80	42.61	
	Minimum corrected weight of impurity in sample (µg):	49.34	0.00	49.34
	Maximum corrected weight of impurity in sample (µg):	67.14	0.00	67.14
Al	Measured concentration of impurity in sample (µg/ml):	4.32E-01	1.50E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	62.64	21.00	83.64
	Weight of impurity in blank (µg):	5.46	3.45	
	Minimum corrected weight of impurity in sample (µg):	57.18	17.55	74.72
	Maximum corrected weight of impurity in sample (µg):	57.18	17.55	74.72
Ti	Measured concentration of impurity in sample (µg/ml):	2.06E-02	2.19E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	2.99	3.07	6.05
	Weight of impurity in blank (µg):	< 3.56	< 2.74	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.33	0.33
	Maximum corrected weight of impurity in sample (µg):	2.99	3.07	6.05
V	Measured concentration of impurity in sample (µg/ml):	2.22E-01	5.76E-02	**V**
	Uncorrected weight of impurity in sample (µg):	32.19	8.06	40.25
	Weight of impurity in blank (µg):	< 0.89	< 0.69	
	Minimum corrected weight of impurity in sample (µg):	31.30	7.38	38.68
	Maximum corrected weight of impurity in sample (µg):	32.19	8.06	40.25

Comments

FCM Checked the official results of analyses for RMAL1881 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	141, 138, 111, 064, 053
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09042402	L09042802	
	Number of compacts:	5		
	Total volume of leach solution (ml):	148.0	141.0	
	Radiochemical laboratory analysis number:	1881-002	1881-009	
	Measured uranium concentration (µg/ml):	2.83E+00	1.25E-01	
	Uncertainty in uranium concentration (µg/ml):	2.83E-01	1.25E-02	
	Weight uranium leached (g):	4.19E-04	1.76E-05	4.36E-04
	Uncertainty in weight uranium leached (g):	4.19E-05	1.76E-06	4.20E-05
	Effective number of exposed kernels:	1.1	0.0	1.1
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	< 1.03E-01	< 1.03E-01	**Fe**
	Uncorrected weight of impurity in sample (µg):	<15.24	<14.52	<29.77
	Weight of impurity in blank (µg):	<18.33	<14.11	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	15.24	14.52	29.77
Cr	Measured concentration of impurity in sample (µg/ml):	8.93E-03	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.32	< 0.71	< 2.03
	Weight of impurity in blank (µg):	< 0.89	< 0.69	
	Minimum corrected weight of impurity in sample (µg):	0.43	0.00	0.43
	Maximum corrected weight of impurity in sample (µg):	1.32	0.71	2.03
Mn	Measured concentration of impurity in sample (µg/ml):	< 4.77E-03	< 4.77E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.71	< 0.67	< 1.38
	Weight of impurity in blank (µg):	< 0.85	< 0.65	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.71	0.67	1.38
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.60	< 0.57	< 1.17
	Weight of impurity in blank (µg):	< 0.72	< 0.56	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.60	0.57	1.17
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 2.96	< 2.82	< 5.78
	Weight of impurity in blank (µg):	< 3.56	< 2.74	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.96	2.82	5.78
Ca	Measured concentration of impurity in sample (µg/ml):	5.02E-01	1.31E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	74.30	18.47	92.77
	Weight of impurity in blank (µg):	<17.80	42.61	
	Minimum corrected weight of impurity in sample (µg):	56.50	0.00	56.50
	Maximum corrected weight of impurity in sample (µg):	74.30	0.00	74.30
Al	Measured concentration of impurity in sample (µg/ml):	5.28E-01	1.07E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	78.14	15.09	93.23
	Weight of impurity in blank (µg):	5.46	3.45	
	Minimum corrected weight of impurity in sample (µg):	72.68	11.63	84.31
	Maximum corrected weight of impurity in sample (µg):	72.68	11.63	84.31
Ti	Measured concentration of impurity in sample (µg/ml):	3.26E-02	2.05E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	4.82	2.89	7.72
	Weight of impurity in blank (µg):	< 3.56	< 2.74	
	Minimum corrected weight of impurity in sample (µg):	1.26	0.15	1.42
	Maximum corrected weight of impurity in sample (µg):	4.82	2.89	7.72
V	Measured concentration of impurity in sample (µg/ml):	2.22E-01	5.10E-02	**V**
	Uncorrected weight of impurity in sample (µg):	32.86	7.19	40.05
	Weight of impurity in blank (µg):	< 0.89	< 0.69	
	Minimum corrected weight of impurity in sample (µg):	31.97	6.51	38.47
	Maximum corrected weight of impurity in sample (µg):	32.86	7.19	40.05

Comments

FCM Checked the official results of analyses for RMAL1881 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	023, 076, 006, 040, 034
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
Deconsolidation-leach solution ID:		L09042403	L09042803	
Number of compacts:		5		
Total volume of leach solution (ml):		147.0	139.0	
Radiochemical laboratory analysis number:		1881-003	1881-010	
Measured uranium concentration (µg/ml):		4.82E-02	9.97E-03	
Uncertainty in uranium concentration (µg/ml):		4.82E-03	9.97E-04	
Weight uranium leached (g):		7.09E-06	1.39E-06	8.47E-06
Uncertainty in weight uranium leached (g):		7.09E-07	1.39E-07	7.23E-07
Effective number of exposed kernels:		0.0	0.0	0.0
Uncertainty in effective number of exposed kernels:		0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 1.03E-01	< 1.03E-01	**Fe**
	Uncorrected weight of impurity in sample (µg):	<15.14	<14.32	<29.46
	Weight of impurity in blank (µg):	<18.33	<14.11	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	15.14	14.32	29.46
Cr	Measured concentration of impurity in sample (µg/ml):	1.18E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.73	< 0.70	< 2.43
	Weight of impurity in blank (µg):	< 0.89	< 0.69	
	Minimum corrected weight of impurity in sample (µg):	0.84	0.00	0.84
	Maximum corrected weight of impurity in sample (µg):	1.73	0.70	2.43
Mn	Measured concentration of impurity in sample (µg/ml):	< 4.77E-03	< 4.77E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.70	< 0.66	< 1.36
	Weight of impurity in blank (µg):	< 0.85	< 0.65	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.70	0.66	1.36
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.60	< 0.56	< 1.16
	Weight of impurity in blank (µg):	< 0.72	< 0.56	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.60	0.56	1.16
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 2.94	< 2.78	< 5.72
	Weight of impurity in blank (µg):	< 3.56	< 2.74	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.94	2.78	5.72
Ca	Measured concentration of impurity in sample (µg/ml):	8.46E-01	1.08E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	124.36	15.01	139.37
	Weight of impurity in blank (µg):	<17.80	42.61	
	Minimum corrected weight of impurity in sample (µg):	106.56	0.00	106.56
	Maximum corrected weight of impurity in sample (µg):	124.36	0.00	124.36
Al	Measured concentration of impurity in sample (µg/ml):	4.23E-01	7.50E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	62.18	10.43	72.61
	Weight of impurity in blank (µg):	5.46	3.45	
	Minimum corrected weight of impurity in sample (µg):	56.72	6.97	63.69
	Maximum corrected weight of impurity in sample (µg):	56.72	6.97	63.69
Ti	Measured concentration of impurity in sample (µg/ml):	3.40E-02	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	5.00	< 2.78	< 7.78
	Weight of impurity in blank (µg):	< 3.56	< 2.74	
	Minimum corrected weight of impurity in sample (µg):	1.44	0.00	1.44
	Maximum corrected weight of impurity in sample (µg):	5.00	2.78	7.78
V	Measured concentration of impurity in sample (µg/ml):	2.17E-01	4.11E-02	**V**
	Uncorrected weight of impurity in sample (µg):	31.90	5.71	37.61
	Weight of impurity in blank (µg):	< 0.89	< 0.69	
	Minimum corrected weight of impurity in sample (µg):	31.01	5.03	36.04
	Maximum corrected weight of impurity in sample (µg):	31.90	5.71	37.61

Comments

FCM Checked the official results of analyses for RMAL1881 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	139, 083, 087, 145, 049
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09042404	L09042804	
	Number of compacts:	5		
	Total volume of leach solution (ml):	147.0	138.0	
	Radiochemical laboratory analysis number:	1881-004	1881-011	
	Measured uranium concentration (µg/ml):	1.36E+00	1.27E-01	
	Uncertainty in uranium concentration (µg/ml):	1.36E-01	1.27E-02	
	Weight uranium leached (g):	2.00E-04	1.75E-05	2.17E-04
	Uncertainty in weight uranium leached (g):	2.00E-05	1.75E-06	2.01E-05
	Effective number of exposed kernels:	0.5	0.0	0.6
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	< 1.03E-01	< 1.03E-01	**Fe**
	Uncorrected weight of impurity in sample (µg):	<15.14	<14.21	<29.36
	Weight of impurity in blank (µg):	<18.33	<14.11	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	15.14	14.21	29.36
Cr	Measured concentration of impurity in sample (µg/ml):	1.01E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.48	< 0.69	< 2.17
	Weight of impurity in blank (µg):	< 0.89	< 0.69	
	Minimum corrected weight of impurity in sample (µg):	0.59	0.00	0.59
	Maximum corrected weight of impurity in sample (µg):	1.48	0.69	2.17
Mn	Measured concentration of impurity in sample (µg/ml):	4.77E-03	< 4.77E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	0.70	< 0.66	< 1.36
	Weight of impurity in blank (µg):	< 0.85	< 0.65	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.70	0.66	1.36
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.60	< 0.56	< 1.16
	Weight of impurity in blank (µg):	< 0.72	< 0.56	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.60	0.56	1.16
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 2.94	< 2.76	< 5.70
	Weight of impurity in blank (µg):	< 3.56	< 2.74	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.94	2.76	5.70
Ca	Measured concentration of impurity in sample (µg/ml):	5.06E-01	1.69E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	74.38	23.32	97.70
	Weight of impurity in blank (µg):	<17.80	42.61	
	Minimum corrected weight of impurity in sample (µg):	56.58	0.00	56.58
	Maximum corrected weight of impurity in sample (µg):	74.38	0.00	74.38
Al	Measured concentration of impurity in sample (µg/ml):	4.47E-01	1.15E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	65.71	15.87	81.58
	Weight of impurity in blank (µg):	5.46	3.45	
	Minimum corrected weight of impurity in sample (µg):	60.24	12.42	72.66
	Maximum corrected weight of impurity in sample (µg):	60.24	12.42	72.66
Ti	Measured concentration of impurity in sample (µg/ml):	3.72E-02	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	5.47	< 2.76	< 8.23
	Weight of impurity in blank (µg):	< 3.56	< 2.74	
	Minimum corrected weight of impurity in sample (µg):	1.91	0.00	1.91
	Maximum corrected weight of impurity in sample (µg):	5.47	2.76	8.23
V	Measured concentration of impurity in sample (µg/ml):	2.40E-01	5.37E-02	**V**
	Uncorrected weight of impurity in sample (µg):	35.28	7.41	42.69
	Weight of impurity in blank (µg):	< 0.89	< 0.69	
	Minimum corrected weight of impurity in sample (µg):	34.39	6.73	41.12
	Maximum corrected weight of impurity in sample (µg):	35.28	7.41	42.69

Comments

FCM Checked the official results of analyses for RMAL1881 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	Deconsolidation Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09042405	L09042805	
	Number of compacts:	None		
	Total volume of leach solution (ml):	178.0	137.0	
	Radiochemical laboratory analysis number:	1881-005	1881-012	
	Measured uranium concentration (µg/ml):	<5.00E-04	<5.00E-04	
	Uncertainty in uranium concentration (µg/ml):			
	Weight uranium leached (g):	<8.90E-08	<6.85E-08	<1.58E-07
	Uncertainty in weight uranium leached (g):			
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:			
Fe	Measured concentration (µg/ml):	< 1.03E-01	< 1.03E-01	Fe
	Total weight of leached impurity (µg):	<18.33	<14.11	<32.45
Cr	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.89	< 0.69	< 1.58
Mn	Measured concentration (µg/ml):	< 4.77E-03	< 4.77E-03	Mn
	Total weight of leached impurity (µg):	< 0.85	< 0.65	< 1.50
Co	Measured concentration (µg/ml):	< 4.06E-03	< 4.06E-03	Co
	Total weight of leached impurity (µg):	< 0.72	< 0.56	< 1.28
Ni	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ni
	Total weight of leached impurity (µg):	< 3.56	< 2.74	< 6.30
Ca	Measured concentration (µg/ml):	< 1.00E-01	3.11E-01	Ca
	Total weight of leached impurity (µg):	<17.80	42.61	<60.41
Al	Measured concentration (µg/ml):	3.07E-02	2.52E-02	Al
	Total weight of leached impurity (µg):	5.46	3.45	8.92
Ti	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ti
	Total weight of leached impurity (µg):	< 3.56	< 2.74	< 6.30
V	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	V
	Total weight of leached impurity (µg):	< 0.89	< 0.69	< 1.58

Comments

FCM Checked the official results of analyses for RMAL1881 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	060, 046, 122, 146, 130
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09051101	B09051206	
	Number of compacts:	5		
	Total volume of leach solution (ml):	52.0	55.5	
	Radiochemical laboratory analysis number:	1910-011	1918-006	
	Measured uranium concentration (µg/ml):	4.48E-01	6.64E-03	
	Uncertainty in uranium concentration (µg/ml):	4.48E-02	6.64E-04	
	Weight uranium leached (g):	2.33E-05	3.69E-07	2.37E-05
	Uncertainty in weight uranium leached (g):	2.35E-06	3.71E-08	2.35E-06
	Number of leached kernels:	0.1	0.0	0.1
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	1.12E-01	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	5.82	< 2.29	< 8.11
	Weight of impurity in blank (µg):	3.46	< 2.22	
	Minimum corrected weight of impurity in sample (µg):	2.37	0.00	2.37
	Maximum corrected weight of impurity in sample (µg):	2.37	2.29	4.65
Cr	Measured concentration of impurity in sample (µg/ml):	1.57E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.82	< 0.11	< 0.93
	Weight of impurity in blank (µg):	0.20	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.62	0.00	0.62
	Maximum corrected weight of impurity in sample (µg):	0.62	0.11	0.73
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.10	< 0.11	< 0.21
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.10	0.11	0.21
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.09	< 0.17
	Weight of impurity in blank (µg):	0.29	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.00	0.09	0.09
Ni	Measured concentration of impurity in sample (µg/ml):	9.92E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.52	< 0.44	< 0.96
	Weight of impurity in blank (µg):	< 0.41	< 0.43	
	Minimum corrected weight of impurity in sample (µg):	0.10	0.00	0.10
	Maximum corrected weight of impurity in sample (µg):	0.52	0.44	0.96
Ca	Measured concentration of impurity in sample (µg/ml):	2.16E+00	1.15E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	112.32	6.38	118.70
	Weight of impurity in blank (µg):	< 5.15	< 5.40	
	Minimum corrected weight of impurity in sample (µg):	107.17	0.98	108.15
	Maximum corrected weight of impurity in sample (µg):	112.32	6.38	118.70
Al	Measured concentration of impurity in sample (µg/ml):	1.42E+00	4.64E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	73.84	2.58	76.42
	Weight of impurity in blank (µg):	2.60	0.71	
	Minimum corrected weight of impurity in sample (µg):	71.24	1.86	73.10
	Maximum corrected weight of impurity in sample (µg):	71.24	1.86	73.10
Ti	Measured concentration of impurity in sample (µg/ml):	1.62E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	8.42	< 0.44	< 8.87
	Weight of impurity in blank (µg):	< 0.41	< 0.43	
	Minimum corrected weight of impurity in sample (µg):	8.01	0.00	8.01
	Maximum corrected weight of impurity in sample (µg):	8.42	0.44	8.87
V	Measured concentration of impurity in sample (µg/ml):	1.03E+00	6.74E-03	**V**
	Uncorrected weight of impurity in sample (µg):	53.56	0.37	53.93
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	53.46	0.27	53.72
	Maximum corrected weight of impurity in sample (µg):	53.56	0.37	53.93

Comments

FCM Checked the official results of analyses for RMAL1910 and RMAL1918 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	141, 138, 111, 064, 053
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09051102	B09051207	
	Number of compacts:	5		
	Total volume of leach solution (ml):	53.0	54.0	
	Radiochemical laboratory analysis number:	1910-012	1918-007	
	Measured uranium concentration (µg/ml):	4.43E-01	7.12E-03	
	Uncertainty in uranium concentration (µg/ml):	4.43E-02	7.12E-04	
	Weight uranium leached (g):	2.35E-05	3.84E-07	2.39E-05
	Uncertainty in weight uranium leached (g):	2.37E-06	3.87E-08	2.37E-06
	Number of leached kernels:	0.1	0.0	0.1
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	4.06E-01	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	21.52	< 2.22	<23.74
	Weight of impurity in blank (µg):	3.46	< 2.22	
	Minimum corrected weight of impurity in sample (µg):	18.06	0.00	18.06
	Maximum corrected weight of impurity in sample (µg):	18.06	2.22	20.29
Cr	Measured concentration of impurity in sample (µg/ml):	1.52E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.81	< 0.11	< 0.91
	Weight of impurity in blank (µg):	0.20	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.61	0.00	0.61
	Maximum corrected weight of impurity in sample (µg):	0.61	0.11	0.72
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.10	< 0.10	< 0.20
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.10	0.10	0.20
Co	Measured concentration of impurity in sample (µg/ml):	1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	0.09	< 0.09	< 0.17
	Weight of impurity in blank (µg):	0.29	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.00	0.09	0.09
Ni	Measured concentration of impurity in sample (µg/ml):	9.64E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.51	< 0.43	< 0.94
	Weight of impurity in blank (µg):	< 0.41	< 0.43	
	Minimum corrected weight of impurity in sample (µg):	0.10	0.00	0.10
	Maximum corrected weight of impurity in sample (µg):	0.51	0.43	0.94
Ca	Measured concentration of impurity in sample (µg/ml):	1.98E+00	2.98E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	104.94	16.09	121.03
	Weight of impurity in blank (µg):	< 5.15	< 5.40	
	Minimum corrected weight of impurity in sample (µg):	99.79	10.69	110.48
	Maximum corrected weight of impurity in sample (µg):	104.94	16.09	121.03
Al	Measured concentration of impurity in sample (µg/ml):	1.36E+00	5.16E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	72.08	2.79	74.87
	Weight of impurity in blank (µg):	2.60	0.71	
	Minimum corrected weight of impurity in sample (µg):	69.48	2.07	71.55
	Maximum corrected weight of impurity in sample (µg):	69.48	2.07	71.55
Ti	Measured concentration of impurity in sample (µg/ml):	1.33E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	7.05	< 0.43	< 7.48
	Weight of impurity in blank (µg):	< 0.41	< 0.43	
	Minimum corrected weight of impurity in sample (µg):	6.64	0.00	6.64
	Maximum corrected weight of impurity in sample (µg):	7.05	0.43	7.48
V	Measured concentration of impurity in sample (µg/ml):	1.00E+00	7.22E-03	**V**
	Uncorrected weight of impurity in sample (µg):	53.00	0.39	53.39
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	52.90	0.28	53.18
	Maximum corrected weight of impurity in sample (µg):	53.00	0.39	53.39

Comments

FCM Checked the official results of analyses for RMAL1910 and RMAL1918 on 7/10/2009

Fred C. Montgomery — Operator

7-23-09 — Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	023, 076, 006, 040, 034
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09051103	B09051208	
	Number of compacts:	5		
	Total volume of leach solution (ml):	52.5	57.0	
	Radiochemical laboratory analysis number:	1910-013	1918-008	
	Measured uranium concentration (µg/ml):	4.39E-01	5.86E-03	
	Uncertainty in uranium concentration (µg/ml):	4.39E-02	5.86E-04	
	Weight uranium leached (g):	2.30E-05	3.34E-07	2.34E-05
	Uncertainty in weight uranium leached (g):	2.32E-06	3.36E-08	2.32E-06
	Number of leached kernels:	0.1	0.0	0.1
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	8.01E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	4.21	< 2.35	< 6.55
	Weight of impurity in blank (µg):	3.46	< 2.22	
	Minimum corrected weight of impurity in sample (µg):	0.75	0.00	0.75
	Maximum corrected weight of impurity in sample (µg):	0.75	2.35	3.10
Cr	Measured concentration of impurity in sample (µg/ml):	1.50E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.79	< 0.11	< 0.90
	Weight of impurity in blank (µg):	0.20	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.59	0.00	0.59
	Maximum corrected weight of impurity in sample (µg):	0.59	0.11	0.70
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.10	< 0.11	< 0.21
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.10	0.11	0.21
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.09	< 0.09	< 0.18
	Weight of impurity in blank (µg):	0.29	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.00	0.09	0.09
Ni	Measured concentration of impurity in sample (µg/ml):	8.96E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.47	< 0.46	< 0.93
	Weight of impurity in blank (µg):	< 0.41	< 0.43	
	Minimum corrected weight of impurity in sample (µg):	0.06	0.00	0.06
	Maximum corrected weight of impurity in sample (µg):	0.47	0.46	0.93
Ca	Measured concentration of impurity in sample (µg/ml):	1.98E+00	1.49E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	103.95	8.49	112.44
	Weight of impurity in blank (µg):	< 5.15	< 5.40	
	Minimum corrected weight of impurity in sample (µg):	98.80	3.09	101.89
	Maximum corrected weight of impurity in sample (µg):	103.95	8.49	112.44
Al	Measured concentration of impurity in sample (µg/ml):	1.42E+00	4.51E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	74.55	2.57	77.12
	Weight of impurity in blank (µg):	2.60	0.71	
	Minimum corrected weight of impurity in sample (µg):	71.95	1.86	73.81
	Maximum corrected weight of impurity in sample (µg):	71.95	1.86	73.81
Ti	Measured concentration of impurity in sample (µg/ml):	1.83E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	9.61	< 0.46	<10.06
	Weight of impurity in blank (µg):	< 0.41	< 0.43	
	Minimum corrected weight of impurity in sample (µg):	9.20	0.00	9.20
	Maximum corrected weight of impurity in sample (µg):	9.61	0.46	10.06
V	Measured concentration of impurity in sample (µg/ml):	1.04E+00	5.59E-03	**V**
	Uncorrected weight of impurity in sample (µg):	54.60	0.32	54.92
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	54.50	0.21	54.71
	Maximum corrected weight of impurity in sample (µg):	54.60	0.32	54.92

Comments

FCM Checked the official results of analyses for RMAL1910 and RMAL1918 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	139, 083, 087, 145, 049
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09051104	B09051209	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.0	52.5	
	Radiochemical laboratory analysis number:	1910-014	1918-009	
	Measured uranium concentration (µg/ml):	4.99E-01	6.31E-03	
	Uncertainty in uranium concentration (µg/ml):	4.99E-02	6.31E-04	
	Weight uranium leached (g):	2.45E-05	3.31E-07	2.48E-05
	Uncertainty in weight uranium leached (g):	2.47E-06	3.34E-08	2.47E-06
	Number of leached kernels:	0.1	0.0	0.1
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	8.73E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	4.28	< 2.16	< 6.44
	Weight of impurity in blank (µg):	3.46	< 2.22	
	Minimum corrected weight of impurity in sample (µg):	0.82	0.00	0.82
	Maximum corrected weight of impurity in sample (µg):	0.82	2.16	2.99
Cr	Measured concentration of impurity in sample (µg/ml):	1.49E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.73	< 0.11	< 0.84
	Weight of impurity in blank (µg):	0.20	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.53	0.00	0.53
	Maximum corrected weight of impurity in sample (µg):	0.53	0.11	0.64
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.09	< 0.10	< 0.19
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.09	0.10	0.19
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.09	< 0.16
	Weight of impurity in blank (µg):	0.29	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.00	0.09	0.09
Ni	Measured concentration of impurity in sample (µg/ml):	8.30E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.41	< 0.42	< 0.83
	Weight of impurity in blank (µg):	< 0.41	< 0.43	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.41	0.42	0.83
Ca	Measured concentration of impurity in sample (µg/ml):	1.95E+00	1.29E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	95.55	6.77	102.32
	Weight of impurity in blank (µg):	< 5.15	< 5.40	
	Minimum corrected weight of impurity in sample (µg):	90.40	1.37	91.77
	Maximum corrected weight of impurity in sample (µg):	95.55	6.77	102.32
Al	Measured concentration of impurity in sample (µg/ml):	1.48E+00	3.74E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	72.52	1.96	74.48
	Weight of impurity in blank (µg):	2.60	0.71	
	Minimum corrected weight of impurity in sample (µg):	69.92	1.25	71.17
	Maximum corrected weight of impurity in sample (µg):	69.92	1.25	71.17
Ti	Measured concentration of impurity in sample (µg/ml):	1.36E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	6.66	< 0.42	< 7.08
	Weight of impurity in blank (µg):	< 0.41	< 0.43	
	Minimum corrected weight of impurity in sample (µg):	6.25	0.00	6.25
	Maximum corrected weight of impurity in sample (µg):	6.66	0.42	7.08
V	Measured concentration of impurity in sample (µg/ml):	1.09E+00	6.26E-03	**V**
	Uncorrected weight of impurity in sample (µg):	53.41	0.33	53.74
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	53.31	0.22	53.53
	Maximum corrected weight of impurity in sample (µg):	53.41	0.33	53.74

Comments

FCM Checked the official results of analyses for RMAL1910 and RMAL1918 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	Burn-Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09051105	B09051210	
	Number of compacts:	None		
	Total volume of leach solution (ml):	51.5	54.0	
	Radiochemical laboratory analysis number:	1910-015	1918-010	
	Measured uranium concentration (µg/ml):	< 5.00E-04	< 5.00E-04	
	Uncertainty in uranium concentration (µg/ml):			
	Weight uranium leached (g):	<2.58E-08	<2.70E-08	<5.28E-08
	Uncertainty in weight uranium leached (g):			
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:			
Fe	Measured concentration (µg/ml):	6.71E-02	< 4.12E-02	Fe
	Total weight of leached impurity (µg):	3.46	< 2.22	< 5.68
Cr	Measured concentration (µg/ml):	3.84E-03	< 2.00E-03	Cr
	Total weight of leached impurity (µg):	0.20	< 0.11	< 0.31
Mn	Measured concentration (µg/ml):	< 1.91E-03	< 1.91E-03	Mn
	Total weight of leached impurity (µg):	< 0.10	< 0.10	< 0.20
Co	Measured concentration (µg/ml):	5.65E-03	< 1.62E-03	Co
	Total weight of leached impurity (µg):	0.29	< 0.09	< 0.38
Ni	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ni
	Total weight of leached impurity (µg):	< 0.41	< 0.43	< 0.84
Ca	Measured concentration (µg/ml):	< 1.00E-01	< 1.00E-01	Ca
	Total weight of leached impurity (µg):	< 5.15	< 5.40	<10.55
Al	Measured concentration (µg/ml):	5.05E-02	1.32E-02	Al
	Total weight of leached impurity (µg):	2.60	0.71	3.31
Ti	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ti
	Total weight of leached impurity (µg):	< 0.41	< 0.43	< 0.84
V	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	V
	Total weight of leached impurity (µg):	< 0.10	< 0.11	< 0.21

Comments

FCM Checked the official results of analyses for RMAL1910 and RMAL1918 on 7/10/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	123, 147, 152, 035, 010
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09050401	L09050701	
	Number of compacts:	5		
	Total volume of leach solution (ml):	146.0	125.0	
	Radiochemical laboratory analysis number:	1910-001	1910-006	
	Measured uranium concentration (µg/ml):	4.03E-02	8.95E-03	
	Uncertainty in uranium concentration (µg/ml):	4.03E-03	8.95E-04	
	Weight uranium leached (g):	5.88E-06	1.12E-06	7.00E-06
	Uncertainty in weight uranium leached (g):	5.89E-07	1.12E-07	6.00E-07
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 6.02	< 5.15	<11.17
	Weight of impurity in blank (µg):	< 7.05	< 5.03	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.02	5.15	11.17
Cr	Measured concentration of impurity in sample (µg/ml):	7.70E-03	5.49E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.12	0.69	1.81
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.78	0.44	1.22
	Maximum corrected weight of impurity in sample (µg):	1.12	0.69	1.81
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.28	< 0.24	< 0.52
	Weight of impurity in blank (µg):	< 0.33	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.24	0.52
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.24	< 0.20	< 0.44
	Weight of impurity in blank (µg):	< 0.28	< 0.20	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.20	0.44
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.17	< 1.00	< 2.17
	Weight of impurity in blank (µg):	< 1.37	< 0.98	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.17	1.00	2.17
Ca	Measured concentration of impurity in sample (µg/ml):	2.91E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	42.49	<12.50	<54.99
	Weight of impurity in blank (µg):	<17.10	<12.20	
	Minimum corrected weight of impurity in sample (µg):	25.39	0.00	25.39
	Maximum corrected weight of impurity in sample (µg):	42.49	12.50	54.99
Al	Measured concentration of impurity in sample (µg/ml):	5.11E-01	9.98E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	74.61	12.48	87.08
	Weight of impurity in blank (µg):	4.91	2.84	
	Minimum corrected weight of impurity in sample (µg):	69.70	9.63	79.33
	Maximum corrected weight of impurity in sample (µg):	69.70	9.63	79.33
Ti	Measured concentration of impurity in sample (µg/ml):	2.29E-02	2.07E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	3.34	2.59	5.93
	Weight of impurity in blank (µg):	< 1.37	< 0.98	
	Minimum corrected weight of impurity in sample (µg):	1.98	1.61	3.59
	Maximum corrected weight of impurity in sample (µg):	3.34	2.59	5.93
V	Measured concentration of impurity in sample (µg/ml):	2.29E-01	5.24E-02	**V**
	Uncorrected weight of impurity in sample (µg):	33.43	6.55	39.98
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	33.09	6.31	39.40
	Maximum corrected weight of impurity in sample (µg):	33.43	6.55	39.98

Comments

Checked against official results of analyses for RMAL1910 by FCM on 7/09/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	110, 045, 042, 002, 086
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09050402	L09050702	
	Number of compacts:	5		
	Total volume of leach solution (ml):	146.0	129.0	
	Radiochemical laboratory analysis number:	1910-002	1910-007	
	Measured uranium concentration (µg/ml):	5.18E+00	2.65E-01	
	Uncertainty in uranium concentration (µg/ml):	5.18E-01	2.65E-02	
	Weight uranium leached (g):	7.56E-04	3.42E-05	7.90E-04
	Uncertainty in weight uranium leached (g):	7.57E-05	3.42E-06	7.58E-05
	Effective number of exposed kernels:	1.9	0.1	2.0
	Uncertainty in effective number of exposed kernels:	0.2	0.0	0.2
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 6.02	< 5.31	<11.33
	Weight of impurity in blank (µg):	< 7.05	< 5.03	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.02	5.31	11.33
Cr	Measured concentration of impurity in sample (µg/ml):	1.11E-02	7.87E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.62	1.02	2.64
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	1.28	0.77	2.05
	Maximum corrected weight of impurity in sample (µg):	1.62	1.02	2.64
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.28	< 0.25	< 0.53
	Weight of impurity in blank (µg):	< 0.33	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.25	0.53
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.24	< 0.21	< 0.45
	Weight of impurity in blank (µg):	< 0.28	< 0.20	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.21	0.45
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.17	< 1.03	< 2.20
	Weight of impurity in blank (µg):	< 1.37	< 0.98	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.17	1.03	2.20
Ca	Measured concentration of impurity in sample (µg/ml):	4.10E-01	2.78E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	59.86	35.86	95.72
	Weight of impurity in blank (µg):	<17.10	<12.20	
	Minimum corrected weight of impurity in sample (µg):	42.76	23.66	66.42
	Maximum corrected weight of impurity in sample (µg):	59.86	35.86	95.72
Al	Measured concentration of impurity in sample (µg/ml):	4.21E-01	1.22E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	61.47	15.74	77.20
	Weight of impurity in blank (µg):	4.91	2.84	
	Minimum corrected weight of impurity in sample (µg):	56.56	12.90	69.45
	Maximum corrected weight of impurity in sample (µg):	56.56	12.90	69.45
Ti	Measured concentration of impurity in sample (µg/ml):	3.07E-02	2.88E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	4.48	3.72	8.20
	Weight of impurity in blank (µg):	< 1.37	< 0.98	
	Minimum corrected weight of impurity in sample (µg):	3.11	2.74	5.85
	Maximum corrected weight of impurity in sample (µg):	4.48	3.72	8.20
V	Measured concentration of impurity in sample (µg/ml):	2.34E-01	6.14E-02	**V**
	Uncorrected weight of impurity in sample (µg):	34.16	7.92	42.08
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	33.82	7.68	41.50
	Maximum corrected weight of impurity in sample (µg):	34.16	7.92	42.08

Comments

Checked against official results of analyses for RMAL1910 by FCM on 7/09/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	136, 078, 052, 070, 059
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09050403	L09050703	
	Number of compacts:	5		
	Total volume of leach solution (ml):	143.0	125.0	
	Radiochemical laboratory analysis number:	1910-003	1910-008	
	Measured uranium concentration (µg/ml):	2.74E+00	1.78E-01	
	Uncertainty in uranium concentration (µg/ml):	2.74E-01	1.78E-02	
	Weight uranium leached (g):	3.92E-04	2.23E-05	4.14E-04
	Uncertainty in weight uranium leached (g):	3.92E-05	2.23E-06	3.93E-05
	Effective number of exposed kernels:	1.0	0.1	1.1
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.89	< 5.15	<11.04
	Weight of impurity in blank (µg):	< 7.05	< 5.03	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.89	5.15	11.04
Cr	Measured concentration of impurity in sample (µg/ml):	6.18E-03	4.70E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.88	0.59	1.47
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.54	0.34	0.89
	Maximum corrected weight of impurity in sample (µg):	0.88	0.59	1.47
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.27	< 0.24	< 0.51
	Weight of impurity in blank (µg):	< 0.33	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.27	0.24	0.51
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.20	< 0.43
	Weight of impurity in blank (µg):	< 0.28	< 0.20	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.20	0.43
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.14	< 1.00	< 2.14
	Weight of impurity in blank (µg):	< 1.37	< 0.98	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.14	1.00	2.14
Ca	Measured concentration of impurity in sample (µg/ml):	2.39E-01	4.54E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	34.18	56.75	90.93
	Weight of impurity in blank (µg):	<17.10	<12.20	
	Minimum corrected weight of impurity in sample (µg):	17.08	44.55	61.63
	Maximum corrected weight of impurity in sample (µg):	34.18	56.75	90.93
Al	Measured concentration of impurity in sample (µg/ml):	4.38E-01	9.36E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	62.63	11.70	74.33
	Weight of impurity in blank (µg):	4.91	2.84	
	Minimum corrected weight of impurity in sample (µg):	57.73	8.86	66.58
	Maximum corrected weight of impurity in sample (µg):	57.73	8.86	66.58
Ti	Measured concentration of impurity in sample (µg/ml):	1.73E-02	1.55E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	2.47	1.94	4.41
	Weight of impurity in blank (µg):	< 1.37	< 0.98	
	Minimum corrected weight of impurity in sample (µg):	1.11	0.96	2.07
	Maximum corrected weight of impurity in sample (µg):	2.47	1.94	4.41
V	Measured concentration of impurity in sample (µg/ml):	2.17E-01	6.02E-02	**V**
	Uncorrected weight of impurity in sample (µg):	31.03	7.53	38.56
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	30.69	7.28	37.97
	Maximum corrected weight of impurity in sample (µg):	31.03	7.53	38.56

Comments

Checked against official results of analyses for RMAL1910 by FCM on 7/09/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	033, 044, 124, 075, 032
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09050404	L09050704	
	Number of compacts:	5		
	Total volume of leach solution (ml):	144.0	126.0	
	Radiochemical laboratory analysis number:	1910-004	1910-009	
	Measured uranium concentration (µg/ml):	4.43E-01	1.71E-02	
	Uncertainty in uranium concentration (µg/ml):	4.43E-02	1.71E-03	
	Weight uranium leached (g):	6.38E-05	2.15E-06	6.59E-05
	Uncertainty in weight uranium leached (g):	6.39E-06	2.16E-07	6.39E-06
	Effective number of exposed kernels:	0.2	0.0	0.2
	Uncertainty in effective number of exposed kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.93	< 5.19	<11.12
	Weight of impurity in blank (µg):	< 7.05	< 5.03	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.93	5.19	11.12
Cr	Measured concentration of impurity in sample (µg/ml):	1.25E-02	8.49E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.80	1.07	2.87
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	1.46	0.83	2.28
	Maximum corrected weight of impurity in sample (µg):	1.80	1.07	2.87
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.93E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.28	< 0.24	< 0.52
	Weight of impurity in blank (µg):	< 0.33	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.24	0.52
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.20	< 0.44
	Weight of impurity in blank (µg):	< 0.28	< 0.20	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.20	0.44
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.15	< 1.01	< 2.16
	Weight of impurity in blank (µg):	< 1.37	< 0.98	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.15	1.01	2.16
Ca	Measured concentration of impurity in sample (µg/ml):	9.47E-01	3.54E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	136.37	44.60	180.97
	Weight of impurity in blank (µg):	<17.10	<12.20	
	Minimum corrected weight of impurity in sample (µg):	119.27	32.40	151.67
	Maximum corrected weight of impurity in sample (µg):	136.37	44.60	180.97
Al	Measured concentration of impurity in sample (µg/ml):	5.08E-01	1.95E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	73.15	24.57	97.72
	Weight of impurity in blank (µg):	4.91	2.84	
	Minimum corrected weight of impurity in sample (µg):	68.24	21.73	89.97
	Maximum corrected weight of impurity in sample (µg):	68.24	21.73	89.97
Ti	Measured concentration of impurity in sample (µg/ml):	3.19E-02	3.03E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	4.59	3.82	8.41
	Weight of impurity in blank (µg):	< 1.37	< 0.98	
	Minimum corrected weight of impurity in sample (µg):	3.23	2.84	6.07
	Maximum corrected weight of impurity in sample (µg):	4.59	3.82	8.41
V	Measured concentration of impurity in sample (µg/ml):	2.35E-01	6.61E-02	**V**
	Uncorrected weight of impurity in sample (µg):	33.84	8.33	42.17
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	33.50	8.08	41.58
	Maximum corrected weight of impurity in sample (µg):	33.84	8.33	42.17

Comments

Checked against official results of analyses for RMAL1910 by FCM on 7/09/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	Deconsolidation Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09050405	L09050705	
	Number of compacts:	None		
	Total volume of leach solution (ml):	171.0	122.0	
	Radiochemical laboratory analysis number:	1910-005	1910-010	
	Measured uranium concentration (µg/ml):	<5.00E-04	<5.00E-04	
	Uncertainty in uranium concentration (µg/ml):			
	Weight uranium leached (g):	<8.55E-08	<6.10E-08	<1.47E-07
	Uncertainty in weight uranium leached (g):			
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:			
Fe	Measured concentration (µg/ml):	< 4.12E-02	< 4.12E-02	Fe
	Total weight of leached impurity (µg):	< 7.05	< 5.03	<12.07
Cr	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.34	< 0.24	< 0.59
Mn	Measured concentration (µg/ml):	< 1.91E-03	< 1.91E-03	Mn
	Total weight of leached impurity (µg):	< 0.33	< 0.23	< 0.56
Co	Measured concentration (µg/ml):	< 1.62E-03	< 1.62E-03	Co
	Total weight of leached impurity (µg):	< 0.28	< 0.20	< 0.47
Ni	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ni
	Total weight of leached impurity (µg):	< 1.37	< 0.98	< 2.34
Ca	Measured concentration (µg/ml):	< 1.00E-01	< 1.00E-01	Ca
	Total weight of leached impurity (µg):	<17.10	<12.20	<29.30
Al	Measured concentration (µg/ml):	2.87E-02	2.33E-02	Al
	Total weight of leached impurity (µg):	4.91	2.84	7.75
Ti	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ti
	Total weight of leached impurity (µg):	< 1.37	< 0.98	< 2.34
V	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	V
	Total weight of leached impurity (µg):	< 0.34	< 0.24	< 0.59

Comments

Checked against official results of analyses for RMAL1910 by FCM on 7/09/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	005, 013, 107, 058, 062
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060201	L09060401	
	Number of compacts:	5		
	Total volume of leach solution (ml):	137.0	109.0	
	Radiochemical laboratory analysis number:	1999-001	1999-006	
	Measured uranium concentration (µg/ml):	5.50E+00	4.15E-01	
	Uncertainty in uranium concentration (µg/ml):	5.50E-01	4.15E-02	
	Weight uranium leached (g):	7.54E-04	4.52E-05	7.99E-04
	Uncertainty in weight uranium leached (g):	7.54E-05	4.53E-06	7.56E-05
	Effective number of exposed kernels:	1.9	0.1	2.0
	Uncertainty in effective number of exposed kernels:	0.2	0.0	0.2
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.64	< 4.49	<10.14
	Weight of impurity in blank (µg):	< 6.72	< 4.86	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.64	4.49	10.14
Cr	Measured concentration of impurity in sample (µg/ml):	8.74E-03	9.26E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.20	1.01	2.21
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.87	0.77	1.64
	Maximum corrected weight of impurity in sample (µg):	1.20	1.01	2.21
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.26	< 0.21	< 0.47
	Weight of impurity in blank (µg):	< 0.31	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.26	0.21	0.47
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.22	< 0.18	< 0.40
	Weight of impurity in blank (µg):	< 0.26	< 0.19	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.22	0.18	0.40
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.10	< 0.87	< 1.97
	Weight of impurity in blank (µg):	< 1.30	< 0.94	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.10	0.87	1.97
Ca	Measured concentration of impurity in sample (µg/ml):	< 1.00E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	<13.70	<10.90	<24.60
	Weight of impurity in blank (µg):	<16.30	<11.80	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	13.70	10.90	24.60
Al	Measured concentration of impurity in sample (µg/ml):	1.70E+00	1.64E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	232.90	17.88	250.78
	Weight of impurity in blank (µg):	11.70	3.95	
	Minimum corrected weight of impurity in sample (µg):	221.20	13.92	235.12
	Maximum corrected weight of impurity in sample (µg):	221.20	13.92	235.12
Ti	Measured concentration of impurity in sample (µg/ml):	2.40E-02	3.18E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	3.29	3.47	6.75
	Weight of impurity in blank (µg):	< 1.30	< 0.94	
	Minimum corrected weight of impurity in sample (µg):	1.98	2.52	4.51
	Maximum corrected weight of impurity in sample (µg):	3.29	3.47	6.75
V	Measured concentration of impurity in sample (µg/ml):	2.16E-01	7.76E-02	**V**
	Uncorrected weight of impurity in sample (µg):	29.59	8.46	38.05
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	29.27	8.22	37.49
	Maximum corrected weight of impurity in sample (µg):	29.59	8.46	38.05

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	135, 017, 022, 018, 125
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060202	L09060402	
	Number of compacts:	5		
	Total volume of leach solution (ml):	139.0	112.0	
	Radiochemical laboratory analysis number:	1999-002	1999-007	
	Measured uranium concentration (µg/ml):	5.87E-02	1.98E-02	
	Uncertainty in uranium concentration (µg/ml):	5.87E-03	1.98E-03	
	Weight uranium leached (g):	8.16E-06	2.22E-06	1.04E-05
	Uncertainty in weight uranium leached (g):	8.17E-07	2.22E-07	8.46E-07
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.73	< 4.61	<10.34
	Weight of impurity in blank (µg):	< 6.72	< 4.86	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.73	4.61	10.34
Cr	Measured concentration of impurity in sample (µg/ml):	1.27E-02	8.44E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.77	0.95	2.71
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	1.44	0.71	2.15
	Maximum corrected weight of impurity in sample (µg):	1.77	0.95	2.71
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.27	< 0.21	< 0.48
	Weight of impurity in blank (µg):	< 0.31	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.27	0.21	0.48
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.18	< 0.41
	Weight of impurity in blank (µg):	< 0.26	< 0.19	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.18	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.11	< 0.90	< 2.01
	Weight of impurity in blank (µg):	< 1.30	< 0.94	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.11	0.90	2.01
Ca	Measured concentration of impurity in sample (µg/ml):	< 1.00E-01	2.09E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	<13.90	23.41	<37.31
	Weight of impurity in blank (µg):	<16.30	<11.80	
	Minimum corrected weight of impurity in sample (µg):	0.00	11.61	11.61
	Maximum corrected weight of impurity in sample (µg):	13.90	23.41	37.31
Al	Measured concentration of impurity in sample (µg/ml):	5.07E-01	1.88E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	70.47	21.06	91.53
	Weight of impurity in blank (µg):	11.70	3.95	
	Minimum corrected weight of impurity in sample (µg):	58.77	17.10	75.87
	Maximum corrected weight of impurity in sample (µg):	58.77	17.10	75.87
Ti	Measured concentration of impurity in sample (µg/ml):	3.72E-02	3.42E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	5.17	3.83	9.00
	Weight of impurity in blank (µg):	< 1.30	< 0.94	
	Minimum corrected weight of impurity in sample (µg):	3.87	2.89	6.75
	Maximum corrected weight of impurity in sample (µg):	5.17	3.83	9.00
V	Measured concentration of impurity in sample (µg/ml):	2.58E-01	7.90E-02	**V**
	Uncorrected weight of impurity in sample (µg):	35.86	8.85	44.71
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	35.54	8.61	44.15
	Maximum corrected weight of impurity in sample (µg):	35.86	8.85	44.71

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

1-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	037, 027, 097, 025, 048
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060203	L09060403	
	Number of compacts:	5		
	Total volume of leach solution (ml):	142.0	116.0	
	Radiochemical laboratory analysis number:	1999-003	1999-008	
	Measured uranium concentration (µg/ml):	5.38E-02	1.54E-02	
	Uncertainty in uranium concentration (µg/ml):	5.38E-03	1.54E-03	
	Weight uranium leached (g):	7.64E-06	1.79E-06	9.43E-06
	Uncertainty in weight uranium leached (g):	7.65E-07	1.79E-07	7.85E-07
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.85	< 4.78	<10.63
	Weight of impurity in blank (µg):	< 6.72	< 4.86	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.85	4.78	10.63
Cr	Measured concentration of impurity in sample (µg/ml):	6.74E-03	8.12E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.96	0.94	1.90
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.63	0.71	1.34
	Maximum corrected weight of impurity in sample (µg):	0.96	0.94	1.90
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.27	< 0.22	< 0.49
	Weight of impurity in blank (µg):	< 0.31	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.27	0.22	0.49
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.19	< 0.42
	Weight of impurity in blank (µg):	< 0.26	< 0.19	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.19	0.42
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.14	< 0.93	< 2.06
	Weight of impurity in blank (µg):	< 1.30	< 0.94	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.14	0.93	2.06
Ca	Measured concentration of impurity in sample (µg/ml):	< 1.00E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	<14.20	<11.60	<25.80
	Weight of impurity in blank (µg):	<16.30	<11.80	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	14.20	11.60	25.80
Al	Measured concentration of impurity in sample (µg/ml):	4.64E-01	1.16E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	65.89	13.46	79.34
	Weight of impurity in blank (µg):	11.70	3.95	
	Minimum corrected weight of impurity in sample (µg):	54.18	9.50	63.69
	Maximum corrected weight of impurity in sample (µg):	54.18	9.50	63.69
Ti	Measured concentration of impurity in sample (µg/ml):	2.48E-02	2.79E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	3.52	3.24	6.76
	Weight of impurity in blank (µg):	< 1.30	< 0.94	
	Minimum corrected weight of impurity in sample (µg):	2.22	2.29	4.51
	Maximum corrected weight of impurity in sample (µg):	3.52	3.24	6.76
V	Measured concentration of impurity in sample (µg/ml):	2.10E-01	6.23E-02	**V**
	Uncorrected weight of impurity in sample (µg):	29.82	7.23	37.05
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	29.49	6.99	36.48
	Maximum corrected weight of impurity in sample (µg):	29.82	7.23	37.05

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	129, 149, 100, 029, 066
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060204	L09060404	
	Number of compacts:	5		
	Total volume of leach solution (ml):	139.0	116.0	
	Radiochemical laboratory analysis number:	1999-004	1999-009	
	Measured uranium concentration (µg/ml):	2.72E+00	1.65E-01	
	Uncertainty in uranium concentration (µg/ml):	2.72E-01	1.65E-02	
	Weight uranium leached (g):	3.78E-04	1.91E-05	3.97E-04
	Uncertainty in weight uranium leached (g):	3.78E-05	1.92E-06	3.79E-05
	Effective number of exposed kernels:	1.0	0.0	1.0
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.73	< 4.78	<10.51
	Weight of impurity in blank (µg):	< 6.72	< 4.86	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.73	4.78	10.51
Cr	Measured concentration of impurity in sample (µg/ml):	1.23E-02	6.59E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.71	0.76	2.47
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	1.38	0.53	1.91
	Maximum corrected weight of impurity in sample (µg):	1.71	0.76	2.47
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.27	< 0.22	< 0.49
	Weight of impurity in blank (µg):	< 0.31	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.27	0.22	0.49
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.19	< 0.41
	Weight of impurity in blank (µg):	< 0.26	< 0.19	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.19	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.11	< 0.93	< 2.04
	Weight of impurity in blank (µg):	< 1.30	< 0.94	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.11	0.93	2.04
Ca	Measured concentration of impurity in sample (µg/ml):	< 1.00E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	<13.90	<11.60	<25.50
	Weight of impurity in blank (µg):	<16.30	<11.80	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	13.90	11.60	25.50
Al	Measured concentration of impurity in sample (µg/ml):	5.08E-01	1.44E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	70.61	16.70	87.32
	Weight of impurity in blank (µg):	11.70	3.95	
	Minimum corrected weight of impurity in sample (µg):	58.91	12.75	71.66
	Maximum corrected weight of impurity in sample (µg):	58.91	12.75	71.66
Ti	Measured concentration of impurity in sample (µg/ml):	4.47E-02	3.18E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	6.21	3.69	9.90
	Weight of impurity in blank (µg):	< 1.30	< 0.94	
	Minimum corrected weight of impurity in sample (µg):	4.91	2.74	7.65
	Maximum corrected weight of impurity in sample (µg):	6.21	3.69	9.90
V	Measured concentration of impurity in sample (µg/ml):	2.43E-01	6.57E-02	**V**
	Uncorrected weight of impurity in sample (µg):	33.78	7.62	41.40
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	33.45	7.39	40.84
	Maximum corrected weight of impurity in sample (µg):	33.78	7.62	41.40

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	Deconsolidation Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060205	L09060405	
	Number of compacts:	None		
	Total volume of leach solution (ml):	163.0	118.0	
	Radiochemical laboratory analysis number:	1999-005	1999-010	
	Measured uranium concentration (µg/ml):	2.36E-04	<2.00E-04	
	Uncertainty in uranium concentration (µg/ml):	2.36E-05		
	Weight uranium leached (g):	3.85E-08	<2.36E-08	<6.21E-08
	Uncertainty in weight uranium leached (g):	3.85E-09		
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:	0.0		
Fe	Measured concentration (µg/ml):	< 4.12E-02	< 4.12E-02	Fe
	Total weight of leached impurity (µg):	< 6.72	< 4.86	<11.58
Cr	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.33	< 0.24	< 0.56
Mn	Measured concentration (µg/ml):	< 1.91E-03	< 1.91E-03	Mn
	Total weight of leached impurity (µg):	< 0.31	< 0.23	< 0.54
Co	Measured concentration (µg/ml):	< 1.62E-03	< 1.62E-03	Co
	Total weight of leached impurity (µg):	< 0.26	< 0.19	< 0.46
Ni	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ni
	Total weight of leached impurity (µg):	< 1.30	< 0.94	< 2.25
Ca	Measured concentration (µg/ml):	< 1.00E-01	< 1.00E-01	Ca
	Total weight of leached impurity (µg):	<16.30	<11.80	<28.10
Al	Measured concentration (µg/ml):	7.18E-02	3.35E-02	Al
	Total weight of leached impurity (µg):	11.70	3.95	15.66
Ti	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ti
	Total weight of leached impurity (µg):	< 1.30	< 0.94	< 2.25
V	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	V
	Total weight of leached impurity (µg):	< 0.33	< 0.24	< 0.56

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	005, 013, 107, 058, 062
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09061601	B09061901	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.0	51.5	
	Radiochemical laboratory analysis number:	2014-001	2014-006	
	Measured uranium concentration (µg/ml):	4.15E-01	3.01E-01	
	Uncertainty in uranium concentration (µg/ml):	4.15E-02	3.01E-02	
	Weight uranium leached (g):	2.03E-05	1.55E-05	3.58E-05
	Uncertainty in weight uranium leached (g):	2.05E-06	1.56E-06	2.58E-06
	Number of leached kernels:	0.1	0.0	0.1
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	7.24E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.55	< 2.12	< 5.67
	Weight of impurity in blank (µg):	< 2.06	< 2.16	
	Minimum corrected weight of impurity in sample (µg):	1.49	0.00	1.49
	Maximum corrected weight of impurity in sample (µg):	3.55	2.12	5.67
Cr	Measured concentration of impurity in sample (µg/ml):	1.34E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.66	< 0.10	< 0.76
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.56	0.00	0.56
	Maximum corrected weight of impurity in sample (µg):	0.66	0.10	0.76
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.09	< 0.10	< 0.19
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.09	0.10	0.19
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.08	< 0.16
	Weight of impurity in blank (µg):	< 0.08	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.08	0.08	0.16
Ni	Measured concentration of impurity in sample (µg/ml):	8.25E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.40	< 0.41	< 0.82
	Weight of impurity in blank (µg):	< 0.40	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.40	0.41	0.82
Ca	Measured concentration of impurity in sample (µg/ml):	1.65E+00	2.19E+00	**Ca**
	Uncorrected weight of impurity in sample (µg):	80.85	112.79	193.64
	Weight of impurity in blank (µg):	7.15	49.77	
	Minimum corrected weight of impurity in sample (µg):	73.70	63.02	136.72
	Maximum corrected weight of impurity in sample (µg):	73.70	63.02	136.72
Al	Measured concentration of impurity in sample (µg/ml):	1.30E+00	9.21E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	63.70	4.74	68.44
	Weight of impurity in blank (µg):	2.59	2.85	
	Minimum corrected weight of impurity in sample (µg):	61.11	1.90	63.01
	Maximum corrected weight of impurity in sample (µg):	61.11	1.90	63.01
Ti	Measured concentration of impurity in sample (µg/ml):	1.43E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	7.01	< 0.41	< 7.42
	Weight of impurity in blank (µg):	< 0.40	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	6.61	0.00	6.61
	Maximum corrected weight of impurity in sample (µg):	7.01	0.41	7.42
V	Measured concentration of impurity in sample (µg/ml):	9.85E-01	1.35E-02	**V**
	Uncorrected weight of impurity in sample (µg):	48.27	0.70	48.96
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	48.17	0.59	48.76
	Maximum corrected weight of impurity in sample (µg):	48.27	0.70	48.96

Comments

Checked against official results of RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	135, 017, 022, 018, 125
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09061602	B09061902	
	Number of compacts:	5		
	Total volume of leach solution (ml):	48.0	52.0	
	Radiochemical laboratory analysis number:	2014-002	2014-007	
	Measured uranium concentration (µg/ml):	1.14E+00	4.47E-02	
	Uncertainty in uranium concentration (µg/ml):	1.14E-01	4.47E-03	
	Weight uranium leached (g):	5.47E-05	2.32E-06	5.70E-05
	Uncertainty in weight uranium leached (g):	5.52E-06	2.34E-07	5.53E-06
	Number of leached kernels:	0.1	0.0	0.1
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	1.52E-01	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	7.30	< 2.14	< 9.44
	Weight of impurity in blank (µg):	< 2.06	< 2.16	
	Minimum corrected weight of impurity in sample (µg):	5.24	0.00	5.24
	Maximum corrected weight of impurity in sample (µg):	7.30	2.14	9.44
Cr	Measured concentration of impurity in sample (µg/ml):	1.63E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.78	< 0.10	< 0.89
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.68	0.00	0.68
	Maximum corrected weight of impurity in sample (µg):	0.78	0.10	0.89
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.09	< 0.10	< 0.19
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.09	0.10	0.19
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.08	< 0.16
	Weight of impurity in blank (µg):	< 0.08	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.08	0.08	0.16
Ni	Measured concentration of impurity in sample (µg/ml):	1.07E-02	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.51	< 0.42	< 0.93
	Weight of impurity in blank (µg):	< 0.40	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	0.11	0.00	0.11
	Maximum corrected weight of impurity in sample (µg):	0.51	0.42	0.93
Ca	Measured concentration of impurity in sample (µg/ml):	1.92E+00	2.40E+00	**Ca**
	Uncorrected weight of impurity in sample (µg):	92.16	124.80	216.96
	Weight of impurity in blank (µg):	7.15	49.77	
	Minimum corrected weight of impurity in sample (µg):	85.01	75.03	160.04
	Maximum corrected weight of impurity in sample (µg):	85.01	75.03	160.04
Al	Measured concentration of impurity in sample (µg/ml):	1.35E+00	1.31E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	64.80	6.81	71.61
	Weight of impurity in blank (µg):	2.59	2.85	
	Minimum corrected weight of impurity in sample (µg):	62.21	3.97	66.18
	Maximum corrected weight of impurity in sample (µg):	62.21	3.97	66.18
Ti	Measured concentration of impurity in sample (µg/ml):	1.10E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	5.28	< 0.42	< 5.70
	Weight of impurity in blank (µg):	< 0.40	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	4.88	0.00	4.88
	Maximum corrected weight of impurity in sample (µg):	5.28	0.42	5.70
V	Measured concentration of impurity in sample (µg/ml):	1.03E+00	1.28E-02	**V**
	Uncorrected weight of impurity in sample (µg):	49.44	0.67	50.11
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	49.34	0.56	49.90
	Maximum corrected weight of impurity in sample (µg):	49.44	0.67	50.11

Comments

Checked against official results of RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	037, 027, 097, 025, 048
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09061603	B09061903	
	Number of compacts:	5		
	Total volume of leach solution (ml):	50.5	52.0	
	Radiochemical laboratory analysis number:	2014-003	2014-008	
	Measured uranium concentration (µg/ml):	2.88E-01	1.09E-02	
	Uncertainty in uranium concentration (µg/ml):	2.88E-02	1.09E-03	
	Weight uranium leached (g):	1.45E-05	5.67E-07	1.51E-05
	Uncertainty in weight uranium leached (g):	1.47E-06	5.71E-08	1.47E-06
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	8.88E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	4.48	< 2.14	< 6.63
	Weight of impurity in blank (µg):	< 2.06	< 2.16	
	Minimum corrected weight of impurity in sample (µg):	2.42	0.00	2.42
	Maximum corrected weight of impurity in sample (µg):	4.48	2.14	6.63
Cr	Measured concentration of impurity in sample (µg/ml):	1.56E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.79	< 0.10	< 0.89
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.69	0.00	0.69
	Maximum corrected weight of impurity in sample (µg):	0.79	0.10	0.89
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.10	< 0.10	< 0.20
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.10	0.10	0.20
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.08	< 0.17
	Weight of impurity in blank (µg):	< 0.08	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.08	0.08	0.17
Ni	Measured concentration of impurity in sample (µg/ml):	9.30E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.47	< 0.42	< 0.89
	Weight of impurity in blank (µg):	< 0.40	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	0.07	0.00	0.07
	Maximum corrected weight of impurity in sample (µg):	0.47	0.42	0.89
Ca	Measured concentration of impurity in sample (µg/ml):	2.13E+00	2.25E+00	**Ca**
	Uncorrected weight of impurity in sample (µg):	107.57	117.00	224.57
	Weight of impurity in blank (µg):	7.15	49.77	
	Minimum corrected weight of impurity in sample (µg):	100.42	67.23	167.65
	Maximum corrected weight of impurity in sample (µg):	100.42	67.23	167.65
Al	Measured concentration of impurity in sample (µg/ml):	1.26E+00	1.49E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	63.63	7.75	71.38
	Weight of impurity in blank (µg):	2.59	2.85	
	Minimum corrected weight of impurity in sample (µg):	61.04	4.90	65.94
	Maximum corrected weight of impurity in sample (µg):	61.04	4.90	65.94
Ti	Measured concentration of impurity in sample (µg/ml):	1.52E-01	8.53E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	7.68	0.44	8.12
	Weight of impurity in blank (µg):	< 0.40	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	7.28	0.02	7.30
	Maximum corrected weight of impurity in sample (µg):	7.68	0.44	8.12
V	Measured concentration of impurity in sample (µg/ml):	9.01E-01	1.33E-02	**V**
	Uncorrected weight of impurity in sample (µg):	45.50	0.69	46.19
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	45.40	0.59	45.99
	Maximum corrected weight of impurity in sample (µg):	45.50	0.69	46.19

Comments

Checked against official results of RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	129, 149, 100, 029, 066
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09061604	B09061904	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.5	51.5	
	Radiochemical laboratory analysis number:	2014-004	2014-009	
	Measured uranium concentration (µg/ml):	3.95E-01	7.78E-03	
	Uncertainty in uranium concentration (µg/ml):	3.95E-02	7.78E-04	
	Weight uranium leached (g):	1.96E-05	4.01E-07	2.00E-05
	Uncertainty in weight uranium leached (g):	1.97E-06	4.04E-08	1.97E-06
	Number of leached kernels:	0.0	0.0	0.1
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	1.13E-01	5.22E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	5.59	2.69	8.28
	Weight of impurity in blank (µg):	< 2.06	< 2.16	
	Minimum corrected weight of impurity in sample (µg):	3.53	0.53	4.06
	Maximum corrected weight of impurity in sample (µg):	5.59	2.69	8.28
Cr	Measured concentration of impurity in sample (µg/ml):	1.62E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.80	< 0.10	< 0.90
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.70	0.00	0.70
	Maximum corrected weight of impurity in sample (µg):	0.80	0.10	0.90
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.09	< 0.10	< 0.19
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.09	0.10	0.19
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.08	< 0.16
	Weight of impurity in blank (µg):	< 0.08	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.08	0.08	0.16
Ni	Measured concentration of impurity in sample (µg/ml):	1.06E-02	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.52	< 0.41	< 0.94
	Weight of impurity in blank (µg):	< 0.40	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	0.12	0.00	0.12
	Maximum corrected weight of impurity in sample (µg):	0.52	0.41	0.94
Ca	Measured concentration of impurity in sample (µg/ml):	2.03E+00	3.02E+00	**Ca**
	Uncorrected weight of impurity in sample (µg):	100.49	155.53	256.02
	Weight of impurity in blank (µg):	7.15	49.77	
	Minimum corrected weight of impurity in sample (µg):	93.34	105.76	199.10
	Maximum corrected weight of impurity in sample (µg):	93.34	105.76	199.10
Al	Measured concentration of impurity in sample (µg/ml):	1.30E+00	1.61E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	64.35	8.29	72.64
	Weight of impurity in blank (µg):	2.59	2.85	
	Minimum corrected weight of impurity in sample (µg):	61.76	5.45	67.21
	Maximum corrected weight of impurity in sample (µg):	61.76	5.45	67.21
Ti	Measured concentration of impurity in sample (µg/ml):	1.09E-01	8.24E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	5.40	0.42	5.82
	Weight of impurity in blank (µg):	< 0.40	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	5.00	0.00	5.00
	Maximum corrected weight of impurity in sample (µg):	5.40	0.42	5.82
V	Measured concentration of impurity in sample (µg/ml):	9.19E-01	9.93E-03	**V**
	Uncorrected weight of impurity in sample (µg):	45.49	0.51	46.00
	Weight of impurity in blank (µg):	< 0.10	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	45.39	0.41	45.80
	Maximum corrected weight of impurity in sample (µg):	45.49	0.51	46.00

Comments

Checked against official results of RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	Burn-Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_03.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09061605	B09061905	
	Number of compacts:	None		
	Total volume of leach solution (ml):	50.0	52.5	
	Radiochemical laboratory analysis number:	2014-005	2014-010	
	Measured uranium concentration (µg/ml):	<5.00E-04	<5.00E-04	
	Uncertainty in uranium concentration (µg/ml):			
	Weight uranium leached (g):	<2.50E-08	<2.63E-08	<5.13E-08
	Uncertainty in weight uranium leached (g):			
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:			
Fe	Measured concentration (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Total weight of leached impurity (µg):	< 2.06	< 2.16	< 4.22
Cr	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	**Cr**
	Total weight of leached impurity (µg):	< 0.10	< 0.11	< 0.21
Mn	Measured concentration (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Total weight of leached impurity (µg):	< 0.10	< 0.10	< 0.20
Co	Measured concentration (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Total weight of leached impurity (µg):	< 0.08	< 0.09	< 0.17
Ni	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Total weight of leached impurity (µg):	< 0.40	< 0.42	< 0.82
Ca	Measured concentration (µg/ml):	1.43E-01	9.48E-01	**Ca**
	Total weight of leached impurity (µg):	7.15	49.77	56.92
Al	Measured concentration (µg/ml):	5.18E-02	5.42E-02	**Al**
	Total weight of leached impurity (µg):	2.59	2.85	5.44
Ti	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	**Ti**
	Total weight of leached impurity (µg):	< 0.40	< 0.42	< 0.82
V	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	**V**
	Total weight of leached impurity (µg):	< 0.10	< 0.11	< 0.21

Comments

checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	055, 030, 085, 108, 140
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060801	L09061101	
	Number of compacts:	5		
	Total volume of leach solution (ml):	140.0	113.0	
	Radiochemical laboratory analysis number:	1999-016	1999-021	
	Measured uranium concentration (µg/ml):	2.87E+00	1.69E-01	
	Uncertainty in uranium concentration (µg/ml):	2.87E-01	1.69E-02	
	Weight uranium leached (g):	4.02E-04	1.91E-05	4.21E-04
	Uncertainty in weight uranium leached (g):	4.02E-05	1.91E-06	4.03E-05
	Effective number of exposed kernels:	1.0	0.0	1.1
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.13E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.78	< 4.66	<10.44
	Weight of impurity in blank (µg):	< 6.84	< 4.90	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.78	4.66	10.44
Cr	Measured concentration of impurity in sample (µg/ml):	1.02E-02	7.95E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.43	0.90	2.33
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	1.10	0.66	1.76
	Maximum corrected weight of impurity in sample (µg):	1.43	0.90	2.33
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.93E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.27	< 0.22	< 0.49
	Weight of impurity in blank (µg):	< 0.32	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.27	0.22	0.49
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.18	< 0.41
	Weight of impurity in blank (µg):	< 0.27	< 0.19	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.18	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.12	< 0.90	< 2.02
	Weight of impurity in blank (µg):	< 1.33	< 0.95	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.12	0.90	2.02
Ca	Measured concentration of impurity in sample (µg/ml):	< 1.00E-01	2.77E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	<14.00	31.30	<45.30
	Weight of impurity in blank (µg):	<16.60	<11.90	
	Minimum corrected weight of impurity in sample (µg):	0.00	19.40	19.40
	Maximum corrected weight of impurity in sample (µg):	14.00	31.30	45.30
Al	Measured concentration of impurity in sample (µg/ml):	4.17E-01	1.98E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	58.38	22.37	80.75
	Weight of impurity in blank (µg):	4.80	4.78	
	Minimum corrected weight of impurity in sample (µg):	53.58	17.59	71.17
	Maximum corrected weight of impurity in sample (µg):	53.58	17.59	71.17
Ti	Measured concentration of impurity in sample (µg/ml):	2.89E-02	3.19E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	4.05	3.60	7.65
	Weight of impurity in blank (µg):	< 1.33	< 0.95	
	Minimum corrected weight of impurity in sample (µg):	2.72	2.65	5.37
	Maximum corrected weight of impurity in sample (µg):	4.05	3.60	7.65
V	Measured concentration of impurity in sample (µg/ml):	2.44E-01	7.62E-02	**V**
	Uncorrected weight of impurity in sample (µg):	34.16	8.61	42.77
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	33.83	8.37	42.20
	Maximum corrected weight of impurity in sample (µg):	34.16	8.61	42.77

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	026, 103, 095, 119, 077
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060802	L09061102	
	Number of compacts:	5		
	Total volume of leach solution (ml):	144.0	118.0	
	Radiochemical laboratory analysis number:	1999-017	1999-022	
	Measured uranium concentration (µg/ml):	2.90E+00	1.67E-01	
	Uncertainty in uranium concentration (µg/ml):	2.90E-01	1.67E-02	
	Weight uranium leached (g):	4.18E-04	1.97E-05	4.37E-04
	Uncertainty in weight uranium leached (g):	4.18E-05	1.97E-06	4.18E-05
	Effective number of exposed kernels:	1.1	0.1	1.1
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.93	< 4.86	<10.79
	Weight of impurity in blank (µg):	< 6.84	< 4.90	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.93	4.86	10.79
Cr	Measured concentration of impurity in sample (µg/ml):	7.63E-03	8.60E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.10	1.01	2.11
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.77	0.78	1.54
	Maximum corrected weight of impurity in sample (µg):	1.10	1.01	2.11
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.28	< 0.23	< 0.50
	Weight of impurity in blank (µg):	< 0.32	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.23	0.50
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.19	< 0.42
	Weight of impurity in blank (µg):	< 0.27	< 0.19	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.19	0.42
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.15	< 0.94	< 2.10
	Weight of impurity in blank (µg):	< 1.33	< 0.95	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.15	0.94	2.10
Ca	Measured concentration of impurity in sample (µg/ml):	< 1.00E-01	2.10E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	<14.40	24.78	<39.18
	Weight of impurity in blank (µg):	<16.60	<11.90	
	Minimum corrected weight of impurity in sample (µg):	0.00	12.88	12.88
	Maximum corrected weight of impurity in sample (µg):	14.40	24.78	39.18
Al	Measured concentration of impurity in sample (µg/ml):	3.76E-01	1.72E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	54.14	20.30	74.44
	Weight of impurity in blank (µg):	4.80	4.78	
	Minimum corrected weight of impurity in sample (µg):	49.35	15.51	64.86
	Maximum corrected weight of impurity in sample (µg):	49.35	15.51	64.86
Ti	Measured concentration of impurity in sample (µg/ml):	2.43E-02	3.11E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	3.50	3.67	7.17
	Weight of impurity in blank (µg):	< 1.33	< 0.95	
	Minimum corrected weight of impurity in sample (µg):	2.17	2.72	4.89
	Maximum corrected weight of impurity in sample (µg):	3.50	3.67	7.17
V	Measured concentration of impurity in sample (µg/ml):	2.33E-01	7.22E-02	**V**
	Uncorrected weight of impurity in sample (µg):	33.55	8.52	42.07
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	33.22	8.28	41.50
	Maximum corrected weight of impurity in sample (µg):	33.55	8.52	42.07

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

1-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	112, 009, 155, 056, 001
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060803	L09061103	
	Number of compacts:	5		
	Total volume of leach solution (ml):	140.0	119.0	
	Radiochemical laboratory analysis number:	1999-018	1999-023	
	Measured uranium concentration (µg/ml):	3.90E-02	1.31E-02	
	Uncertainty in uranium concentration (µg/ml):	3.90E-03	1.31E-03	
	Weight uranium leached (g):	5.46E-06	1.56E-06	7.02E-06
	Uncertainty in weight uranium leached (g):	5.47E-07	1.56E-07	5.68E-07
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.77	< 4.90	<10.67
	Weight of impurity in blank (µg):	< 6.84	< 4.90	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.77	4.90	10.67
Cr	Measured concentration of impurity in sample (µg/ml):	5.28E-03	9.38E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.74	1.12	1.86
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.41	0.88	1.29
	Maximum corrected weight of impurity in sample (µg):	0.74	1.12	1.86
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.27	< 0.23	< 0.49
	Weight of impurity in blank (µg):	< 0.32	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.27	0.23	0.49
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.19	< 0.42
	Weight of impurity in blank (µg):	< 0.27	< 0.19	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.19	0.42
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.12	< 0.95	< 2.07
	Weight of impurity in blank (µg):	< 1.33	< 0.95	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.12	0.95	2.07
Ca	Measured concentration of impurity in sample (µg/ml):	2.66E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	37.24	<11.90	<49.14
	Weight of impurity in blank (µg):	<16.60	<11.90	
	Minimum corrected weight of impurity in sample (µg):	20.64	0.00	20.64
	Maximum corrected weight of impurity in sample (µg):	37.24	11.90	49.14
Al	Measured concentration of impurity in sample (µg/ml):	3.61E-01	1.27E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	50.54	15.11	65.65
	Weight of impurity in blank (µg):	4.80	4.78	
	Minimum corrected weight of impurity in sample (µg):	45.74	10.33	56.07
	Maximum corrected weight of impurity in sample (µg):	45.74	10.33	56.07
Ti	Measured concentration of impurity in sample (µg/ml):	1.72E-02	2.44E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	2.41	2.90	5.31
	Weight of impurity in blank (µg):	< 1.33	< 0.95	
	Minimum corrected weight of impurity in sample (µg):	1.08	1.95	3.03
	Maximum corrected weight of impurity in sample (µg):	2.41	2.90	5.31
V	Measured concentration of impurity in sample (µg/ml):	2.16E-01	8.14E-02	**V**
	Uncorrected weight of impurity in sample (µg):	30.24	9.69	39.93
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	29.91	9.45	39.36
	Maximum corrected weight of impurity in sample (µg):	30.24	9.69	39.93

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	144, 134, 051, 115, 088
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060804	L09061104	
	Number of compacts:	5		
	Total volume of leach solution (ml):	140.0	115.0	
	Radiochemical laboratory analysis number:	1999-019	1999-024	
	Measured uranium concentration (µg/ml):	3.90E-02	1.56E-02	
	Uncertainty in uranium concentration (µg/ml):	3.90E-03	1.56E-03	
	Weight uranium leached (g):	5.46E-06	1.79E-06	7.25E-06
	Uncertainty in weight uranium leached (g):	5.47E-07	1.80E-07	5.75E-07
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.77	< 4.74	<10.51
	Weight of impurity in blank (µg):	< 6.84	< 4.90	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.77	4.74	10.51
Cr	Measured concentration of impurity in sample (µg/ml):	6.36E-03	8.78E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.89	1.01	1.90
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.56	0.77	1.33
	Maximum corrected weight of impurity in sample (µg):	0.89	1.01	1.90
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.27	< 0.22	< 0.49
	Weight of impurity in blank (µg):	< 0.32	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.27	0.22	0.49
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.19	< 0.41
	Weight of impurity in blank (µg):	< 0.27	< 0.19	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.19	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.12	< 0.92	< 2.04
	Weight of impurity in blank (µg):	< 1.33	< 0.95	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.12	0.92	2.04
Ca	Measured concentration of impurity in sample (µg/ml):	< 1.00E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	<14.00	<11.50	<25.50
	Weight of impurity in blank (µg):	<16.60	<11.90	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	14.00	11.50	25.50
Al	Measured concentration of impurity in sample (µg/ml):	3.70E-01	1.89E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	51.80	21.74	73.54
	Weight of impurity in blank (µg):	4.80	4.78	
	Minimum corrected weight of impurity in sample (µg):	47.00	16.95	63.95
	Maximum corrected weight of impurity in sample (µg):	47.00	16.95	63.95
Ti	Measured concentration of impurity in sample (µg/ml):	2.20E-02	3.08E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	3.08	3.54	6.62
	Weight of impurity in blank (µg):	< 1.33	< 0.95	
	Minimum corrected weight of impurity in sample (µg):	1.75	2.59	4.34
	Maximum corrected weight of impurity in sample (µg):	3.08	3.54	6.62
V	Measured concentration of impurity in sample (µg/ml):	2.17E-01	7.34E-02	**V**
	Uncorrected weight of impurity in sample (µg):	30.38	8.44	38.82
	Weight of impurity in blank (µg):	< 0.33	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	30.05	8.20	38.25
	Maximum corrected weight of impurity in sample (µg):	30.38	8.44	38.82

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	Deconsolidation Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09060805	L09061105	
	Number of compacts:	None		
	Total volume of leach solution (ml):	166.0	119.0	
	Radiochemical laboratory analysis number:	1999-020	1999-025	
	Measured uranium concentration (µg/ml):	<2.00E-04	<2.00E-04	
	Uncertainty in uranium concentration (µg/ml):			
	Weight uranium leached (g):	<3.32E-08	<2.38E-08	<5.70E-08
	Uncertainty in weight uranium leached (g):			
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:			
Fe	Measured concentration (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Total weight of leached impurity (µg):	< 6.84	< 4.90	<11.74
Cr	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	**Cr**
	Total weight of leached impurity (µg):	< 0.33	< 0.24	< 0.57
Mn	Measured concentration (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Total weight of leached impurity (µg):	< 0.32	< 0.23	< 0.54
Co	Measured concentration (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Total weight of leached impurity (µg):	< 0.27	< 0.19	< 0.46
Ni	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Total weight of leached impurity (µg):	< 1.33	< 0.95	< 2.28
Ca	Measured concentration (µg/ml):	< 1.00E-01	< 1.00E-01	**Ca**
	Total weight of leached impurity (µg):	<16.60	<11.90	<28.50
Al	Measured concentration (µg/ml):	2.89E-02	4.02E-02	**Al**
	Total weight of leached impurity (µg):	4.80	4.78	9.58
Ti	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	**Ti**
	Total weight of leached impurity (µg):	< 1.33	< 0.95	< 2.28
V	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	**V**
	Total weight of leached impurity (µg):	< 0.33	< 0.24	< 0.57

Comments

Checked against official results of RMAL1999 by FCM on 7/14/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	055, 030, 085, 108, 140
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09062301	B09062401	
	Number of compacts:	5		
	Total volume of leach solution (ml):	50.0	50.5	
	Radiochemical laboratory analysis number:	2014-031	2014-036	
	Measured uranium concentration (µg/ml):	3.49E-01	4.71E-03	
	Uncertainty in uranium concentration (µg/ml):	3.49E-02	4.71E-04	
	Weight uranium leached (g):	1.75E-05	2.38E-07	1.77E-05
	Uncertainty in weight uranium leached (g):	1.76E-06	2.40E-08	1.76E-06
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	7.13E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.57	< 2.08	< 5.65
	Weight of impurity in blank (µg):	< 2.18	< 2.16	
	Minimum corrected weight of impurity in sample (µg):	1.38	0.00	1.38
	Maximum corrected weight of impurity in sample (µg):	3.57	2.08	5.65
Cr	Measured concentration of impurity in sample (µg/ml):	1.23E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.62	< 0.10	< 0.72
	Weight of impurity in blank (µg):	< 0.11	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.51	0.00	0.51
	Maximum corrected weight of impurity in sample (µg):	0.62	0.10	0.72
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.10	< 0.10	< 0.19
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.10	0.10	0.19
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.08	< 0.16
	Weight of impurity in blank (µg):	< 0.09	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.08	0.08	0.16
Ni	Measured concentration of impurity in sample (µg/ml):	1.41E-02	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.71	< 0.40	< 1.11
	Weight of impurity in blank (µg):	< 0.42	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	0.28	0.00	0.28
	Maximum corrected weight of impurity in sample (µg):	0.71	0.40	1.11
Ca	Measured concentration of impurity in sample (µg/ml):	2.36E+00	3.14E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	118.00	15.86	133.86
	Weight of impurity in blank (µg):	24.12	< 5.25	
	Minimum corrected weight of impurity in sample (µg):	93.89	10.61	104.49
	Maximum corrected weight of impurity in sample (µg):	93.89	15.86	109.74
Al	Measured concentration of impurity in sample (µg/ml):	1.24E+00	4.56E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	62.00	2.30	64.30
	Weight of impurity in blank (µg):	3.59	< 1.00	
	Minimum corrected weight of impurity in sample (µg):	58.41	1.30	59.71
	Maximum corrected weight of impurity in sample (µg):	58.41	2.30	60.71
Ti	Measured concentration of impurity in sample (µg/ml):	1.51E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	7.55	< 0.40	< 7.95
	Weight of impurity in blank (µg):	< 0.42	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	7.13	0.00	7.13
	Maximum corrected weight of impurity in sample (µg):	7.55	0.40	7.95
V	Measured concentration of impurity in sample (µg/ml):	9.78E-01	6.91E-03	**V**
	Uncorrected weight of impurity in sample (µg):	48.90	0.35	49.25
	Weight of impurity in blank (µg):	< 0.11	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	48.79	0.24	49.04
	Maximum corrected weight of impurity in sample (µg):	48.90	0.35	49.25

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	026, 103, 095, 119, 077
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09062302	B09062402	
	Number of compacts:	5		
	Total volume of leach solution (ml):	50.0	50.0	
	Radiochemical laboratory analysis number:	2014-032	2014-037	
	Measured uranium concentration (µg/ml):	4.46E-01	6.26E-03	
	Uncertainty in uranium concentration (µg/ml):	4.46E-02	6.26E-04	
	Weight uranium leached (g):	2.23E-05	3.13E-07	2.26E-05
	Uncertainty in weight uranium leached (g):	2.25E-06	3.16E-08	2.25E-06
	Number of leached kernels:	0.1	0.0	0.1
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	7.82E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.91	< 2.06	< 5.97
	Weight of impurity in blank (µg):	< 2.18	< 2.16	
	Minimum corrected weight of impurity in sample (µg):	1.73	0.00	1.73
	Maximum corrected weight of impurity in sample (µg):	3.91	2.06	5.97
Cr	Measured concentration of impurity in sample (µg/ml):	1.36E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.68	< 0.10	< 0.78
	Weight of impurity in blank (µg):	< 0.11	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.57	0.00	0.57
	Maximum corrected weight of impurity in sample (µg):	0.68	0.10	0.78
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.10	< 0.10	< 0.19
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.10	0.10	0.19
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.08	< 0.16
	Weight of impurity in blank (µg):	< 0.09	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.08	0.08	0.16
Ni	Measured concentration of impurity in sample (µg/ml):	1.05E-02	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.53	< 0.40	< 0.93
	Weight of impurity in blank (µg):	< 0.42	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	0.10	0.00	0.10
	Maximum corrected weight of impurity in sample (µg):	0.53	0.40	0.93
Ca	Measured concentration of impurity in sample (µg/ml):	2.61E+00	2.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	130.50	10.00	140.50
	Weight of impurity in blank (µg):	24.12	< 5.25	
	Minimum corrected weight of impurity in sample (µg):	106.39	4.75	111.14
	Maximum corrected weight of impurity in sample (µg):	106.39	10.00	116.39
Al	Measured concentration of impurity in sample (µg/ml):	1.49E+00	7.30E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	74.50	3.65	78.15
	Weight of impurity in blank (µg):	3.59	< 1.00	
	Minimum corrected weight of impurity in sample (µg):	70.91	2.65	73.56
	Maximum corrected weight of impurity in sample (µg):	70.91	3.65	74.56
Ti	Measured concentration of impurity in sample (µg/ml):	1.56E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	7.80	< 0.40	< 8.20
	Weight of impurity in blank (µg):	< 0.42	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	7.38	0.00	7.38
	Maximum corrected weight of impurity in sample (µg):	7.80	0.40	8.20
V	Measured concentration of impurity in sample (µg/ml):	1.10E+00	1.02E-02	**V**
	Uncorrected weight of impurity in sample (µg):	55.00	0.51	55.51
	Weight of impurity in blank (µg):	< 0.11	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	54.89	0.41	55.30
	Maximum corrected weight of impurity in sample (µg):	55.00	0.51	55.51

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	112, 009, 155, 056, 001
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09062303	B09062403	
	Number of compacts:	5		
	Total volume of leach solution (ml):	51.5	51.0	
	Radiochemical laboratory analysis number:	2014-033	2014-038	
	Measured uranium concentration (µg/ml):	3.19E-01	9.31E-03	
	Uncertainty in uranium concentration (µg/ml):	3.19E-02	9.31E-04	
	Weight uranium leached (g):	1.64E-05	4.75E-07	1.69E-05
	Uncertainty in weight uranium leached (g):	1.66E-06	4.79E-08	1.66E-06
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	8.79E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	4.53	< 2.10	< 6.63
	Weight of impurity in blank (µg):	< 2.18	< 2.16	
	Minimum corrected weight of impurity in sample (µg):	2.34	0.00	2.34
	Maximum corrected weight of impurity in sample (µg):	4.53	2.10	6.63
Cr	Measured concentration of impurity in sample (µg/ml):	1.48E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.76	< 0.10	< 0.86
	Weight of impurity in blank (µg):	< 0.11	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.66	0.00	0.66
	Maximum corrected weight of impurity in sample (µg):	0.76	0.10	0.86
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.10	< 0.10	< 0.20
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.10	0.10	0.20
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.08	< 0.17
	Weight of impurity in blank (µg):	< 0.09	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.08	0.08	0.17
Ni	Measured concentration of impurity in sample (µg/ml):	9.56E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.49	< 0.41	< 0.90
	Weight of impurity in blank (µg):	< 0.42	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	0.07	0.00	0.07
	Maximum corrected weight of impurity in sample (µg):	0.49	0.41	0.90
Ca	Measured concentration of impurity in sample (µg/ml):	1.83E+00	4.04E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	94.25	20.60	114.85
	Weight of impurity in blank (µg):	24.12	< 5.25	
	Minimum corrected weight of impurity in sample (µg):	70.13	15.35	85.48
	Maximum corrected weight of impurity in sample (µg):	70.13	20.60	90.73
Al	Measured concentration of impurity in sample (µg/ml):	1.23E+00	5.92E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	63.35	3.02	66.36
	Weight of impurity in blank (µg):	3.59	< 1.00	
	Minimum corrected weight of impurity in sample (µg):	59.76	2.02	61.77
	Maximum corrected weight of impurity in sample (µg):	59.76	3.02	62.78
Ti	Measured concentration of impurity in sample (µg/ml):	1.68E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	8.65	< 0.41	< 9.06
	Weight of impurity in blank (µg):	< 0.42	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	8.23	0.00	8.23
	Maximum corrected weight of impurity in sample (µg):	8.65	0.41	9.06
V	Measured concentration of impurity in sample (µg/ml):	1.01E+00	1.01E-02	**V**
	Uncorrected weight of impurity in sample (µg):	52.02	0.52	52.53
	Weight of impurity in blank (µg):	< 0.11	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	51.91	0.41	52.32
	Maximum corrected weight of impurity in sample (µg):	52.02	0.52	52.53

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

1-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	144, 134, 051, 115, 088
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09062304	B09062404	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.5	50.5	
	Radiochemical laboratory analysis number:	2014-034	2014-039	
	Measured uranium concentration (µg/ml):	3.38E-01	9.45E-03	
	Uncertainty in uranium concentration (µg/ml):	3.38E-02	9.45E-04	
	Weight uranium leached (g):	1.67E-05	4.77E-07	1.72E-05
	Uncertainty in weight uranium leached (g):	1.69E-06	4.81E-08	1.69E-06
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	7.43E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.68	< 2.08	< 5.76
	Weight of impurity in blank (µg):	< 2.18	< 2.16	
	Minimum corrected weight of impurity in sample (µg):	1.49	0.00	1.49
	Maximum corrected weight of impurity in sample (µg):	3.68	2.08	5.76
Cr	Measured concentration of impurity in sample (µg/ml):	1.20E-02	< 2.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.59	< 0.10	< 0.70
	Weight of impurity in blank (µg):	< 0.11	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	0.49	0.00	0.49
	Maximum corrected weight of impurity in sample (µg):	0.59	0.10	0.70
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.09	< 0.10	< 0.19
	Weight of impurity in blank (µg):	< 0.10	< 0.10	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.09	0.10	0.19
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.08	< 0.08	< 0.16
	Weight of impurity in blank (µg):	< 0.09	< 0.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.08	0.08	0.16
Ni	Measured concentration of impurity in sample (µg/ml):	8.93E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	0.44	< 0.40	< 0.85
	Weight of impurity in blank (µg):	< 0.42	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	0.02	0.00	0.02
	Maximum corrected weight of impurity in sample (µg):	0.44	0.40	0.85
Ca	Measured concentration of impurity in sample (µg/ml):	2.38E+00	4.38E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	117.81	22.12	139.93
	Weight of impurity in blank (µg):	24.12	< 5.25	
	Minimum corrected weight of impurity in sample (µg):	93.70	16.87	110.56
	Maximum corrected weight of impurity in sample (µg):	93.70	22.12	115.81
Al	Measured concentration of impurity in sample (µg/ml):	1.15E+00	7.26E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	56.93	3.67	60.59
	Weight of impurity in blank (µg):	3.59	< 1.00	
	Minimum corrected weight of impurity in sample (µg):	53.34	2.66	56.00
	Maximum corrected weight of impurity in sample (µg):	53.34	3.67	57.00
Ti	Measured concentration of impurity in sample (µg/ml):	1.58E-01	< 8.00E-03	**Ti**
	Uncorrected weight of impurity in sample (µg):	7.82	< 0.40	< 8.23
	Weight of impurity in blank (µg):	< 0.42	< 0.42	
	Minimum corrected weight of impurity in sample (µg):	7.40	0.00	7.40
	Maximum corrected weight of impurity in sample (µg):	7.82	0.40	8.23
V	Measured concentration of impurity in sample (µg/ml):	8.74E-01	1.05E-02	**V**
	Uncorrected weight of impurity in sample (µg):	43.26	0.53	43.79
	Weight of impurity in blank (µg):	< 0.11	< 0.11	
	Minimum corrected weight of impurity in sample (µg):	43.16	0.43	43.58
	Maximum corrected weight of impurity in sample (µg):	43.26	0.53	43.79

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26B: Measurement of SiC Burn-Leach Defects or Impurities by Burn-Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	Burn-Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_04.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09062305	B09062405	
	Number of compacts:	None		
	Total volume of leach solution (ml):	53.0	52.5	
	Radiochemical laboratory analysis number:	2014-035	2014-040	
	Measured uranium concentration (µg/ml):	<5.00E-04	<5.00E-04	
	Uncertainty in uranium concentration (µg/ml):			
	Weight uranium leached (g):	<2.65E-08	<2.63E-08	<5.28E-08
	Uncertainty in weight uranium leached (g):			
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:			
Fe	Measured concentration (µg/ml):	< 4.12E-02	< 4.12E-02	Fe
	Total weight of leached impurity (µg):	< 2.18	< 2.16	< 4.35
Cr	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.11	< 0.11	< 0.21
Mn	Measured concentration (µg/ml):	< 1.91E-03	< 1.91E-03	Mn
	Total weight of leached impurity (µg):	< 0.10	< 0.10	< 0.20
Co	Measured concentration (µg/ml):	< 1.62E-03	< 1.62E-03	Co
	Total weight of leached impurity (µg):	< 0.09	< 0.09	< 0.17
Ni	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ni
	Total weight of leached impurity (µg):	< 0.42	< 0.42	< 0.84
Ca	Measured concentration (µg/ml):	4.55E-01	< 1.00E-01	Ca
	Total weight of leached impurity (µg):	24.12	< 5.25	<29.37
Al	Measured concentration (µg/ml):	6.77E-02	< 1.91E-02	Al
	Total weight of leached impurity (µg):	3.59	< 1.00	< 4.59
Ti	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ti
	Total weight of leached impurity (µg):	< 0.42	< 0.42	< 0.84
V	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	V
	Total weight of leached impurity (µg):	< 0.11	< 0.11	< 0.21

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	142, 047, 011, 092, 038
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_05.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
Deconsolidation-leach solution ID:		L09061801	L09062201	
Number of compacts:		5		
Total volume of leach solution (ml):		155.0	126.0	
Radiochemical laboratory analysis number:		2014-016	2014-021	
Measured uranium concentration (µg/ml):		3.47E-02	1.03E-02	
Uncertainty in uranium concentration (µg/ml):		3.47E-03	1.03E-03	
Weight uranium leached (g):		5.38E-06	1.30E-06	6.68E-06
Uncertainty in weight uranium leached (g):		5.38E-07	1.30E-07	5.54E-07
Effective number of exposed kernels:		0.0	0.0	0.0
Uncertainty in effective number of exposed kernels:		0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 6.39	< 5.19	<11.58
	Weight of impurity in blank (µg):	< 7.37	< 5.27	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.39	5.19	11.58
Cr	Measured concentration of impurity in sample (µg/ml):	5.98E-03	4.77E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.93	0.60	1.53
	Weight of impurity in blank (µg):	< 0.36	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.57	0.35	0.91
	Maximum corrected weight of impurity in sample (µg):	0.93	0.60	1.53
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.30	< 0.24	< 0.54
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.30	0.24	0.54
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.25	< 0.20	< 0.46
	Weight of impurity in blank (µg):	< 0.29	< 0.21	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.25	0.20	0.46
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.24	< 1.01	< 2.25
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.24	1.01	2.25
Ca	Measured concentration of impurity in sample (µg/ml):	4.12E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	63.86	<12.60	<76.46
	Weight of impurity in blank (µg):	137.11	<12.80	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.00	12.60	12.60
Al	Measured concentration of impurity in sample (µg/ml):	3.60E-01	1.07E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	55.80	13.48	69.28
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	54.37	12.46	66.83
	Maximum corrected weight of impurity in sample (µg):	55.80	13.48	69.28
Ti	Measured concentration of impurity in sample (µg/ml):	3.21E-02	2.31E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	4.98	2.91	7.89
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	3.54	1.89	5.43
	Maximum corrected weight of impurity in sample (µg):	4.98	2.91	7.89
V	Measured concentration of impurity in sample (µg/ml):	2.07E-01	4.88E-02	**V**
	Uncorrected weight of impurity in sample (µg):	32.09	6.15	38.23
	Weight of impurity in blank (µg):	< 0.36	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	31.73	5.89	37.62
	Maximum corrected weight of impurity in sample (µg):	32.09	6.15	38.23

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	069, 050, 039, 150, 028
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_05.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09061802	L09062202	
	Number of compacts:	5		
	Total volume of leach solution (ml):	141.0	130.0	
	Radiochemical laboratory analysis number:	2014-017	2014-022	
	Measured uranium concentration (µg/ml):	3.44E-02	7.78E-03	
	Uncertainty in uranium concentration (µg/ml):	3.44E-03	7.78E-04	
	Weight uranium leached (g):	4.85E-06	1.01E-06	5.86E-06
	Uncertainty in weight uranium leached (g):	4.86E-07	1.01E-07	4.96E-07
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:	0.0	0.0	0.0
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.81	< 5.36	<11.17
	Weight of impurity in blank (µg):	< 7.37	< 5.27	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.81	5.36	11.17
Cr	Measured concentration of impurity in sample (µg/ml):	3.99E-03	3.26E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.56	0.42	0.99
	Weight of impurity in blank (µg):	< 0.36	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.20	0.17	0.37
	Maximum corrected weight of impurity in sample (µg):	0.56	0.42	0.99
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.27	< 0.25	< 0.52
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.27	0.25	0.52
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.23	< 0.21	< 0.44
	Weight of impurity in blank (µg):	< 0.29	< 0.21	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.23	0.21	0.44
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.13	< 1.04	< 2.17
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.13	1.04	2.17
Ca	Measured concentration of impurity in sample (µg/ml):	6.65E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	93.77	<13.00	<106.77
	Weight of impurity in blank (µg):	137.11	<12.80	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.00	13.00	13.00
Al	Measured concentration of impurity in sample (µg/ml):	3.63E-01	8.54E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	51.18	11.10	62.29
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	49.75	10.08	59.83
	Maximum corrected weight of impurity in sample (µg):	51.18	11.10	62.29
Ti	Measured concentration of impurity in sample (µg/ml):	1.40E-02	1.67E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	1.97	2.17	4.15
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.54	1.15	1.69
	Maximum corrected weight of impurity in sample (µg):	1.97	2.17	4.15
V	Measured concentration of impurity in sample (µg/ml):	2.02E-01	6.18E-02	**V**
	Uncorrected weight of impurity in sample (µg):	28.48	8.03	36.52
	Weight of impurity in blank (µg):	< 0.36	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	28.12	7.78	35.90
	Maximum corrected weight of impurity in sample (µg):	28.48	8.03	36.52

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	114, 133, 127, 091, 061
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_05.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09061804	L09062204	
	Number of compacts:	5		
	Total volume of leach solution (ml):	154.0	125.0	
	Radiochemical laboratory analysis number:	2014-019	2014-024	
	Measured uranium concentration (µg/ml):	5.60E+00	1.78E-01	
	Uncertainty in uranium concentration (µg/ml):	5.60E-01	1.78E-02	
	Weight uranium leached (g):	8.62E-04	2.23E-05	8.85E-04
	Uncertainty in weight uranium leached (g):	8.63E-05	2.23E-06	8.63E-05
	Effective number of exposed kernels:	2.2	0.1	2.3
	Uncertainty in effective number of exposed kernels:	0.2	0.0	0.2
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 6.34	< 5.15	<11.49
	Weight of impurity in blank (µg):	< 7.37	< 5.27	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.34	5.15	11.49
Cr	Measured concentration of impurity in sample (µg/ml):	4.74E-03	3.78E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.73	0.47	1.20
	Weight of impurity in blank (µg):	< 0.36	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.37	0.22	0.59
	Maximum corrected weight of impurity in sample (µg):	0.73	0.47	1.20
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.29	< 0.24	< 0.53
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.29	0.24	0.53
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.25	< 0.20	< 0.45
	Weight of impurity in blank (µg):	< 0.29	< 0.21	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.25	0.20	0.45
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.23	< 1.00	< 2.23
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.23	1.00	2.23
Ca	Measured concentration of impurity in sample (µg/ml):	4.09E-01	3.07E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	62.99	38.38	101.36
	Weight of impurity in blank (µg):	137.11	<12.80	
	Minimum corrected weight of impurity in sample (µg):	0.00	25.58	25.58
	Maximum corrected weight of impurity in sample (µg):	0.00	38.38	38.38
Al	Measured concentration of impurity in sample (µg/ml):	4.18E-01	6.59E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	64.37	8.24	72.61
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	62.94	7.21	70.15
	Maximum corrected weight of impurity in sample (µg):	64.37	8.24	72.61
Ti	Measured concentration of impurity in sample (µg/ml):	3.12E-02	2.38E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	4.80	2.98	7.78
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	3.37	1.95	5.32
	Maximum corrected weight of impurity in sample (µg):	4.80	2.98	7.78
V	Measured concentration of impurity in sample (µg/ml):	2.23E-01	4.18E-02	**V**
	Uncorrected weight of impurity in sample (µg):	34.34	5.23	39.57
	Weight of impurity in blank (µg):	< 0.36	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	33.98	4.97	38.95
	Maximum corrected weight of impurity in sample (µg):	34.34	5.23	39.57

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	099, 024, 031, 104, 101
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_05.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09061805	L09062205	
	Number of compacts:	5		
	Total volume of leach solution (ml):	149.0	126.0	
	Radiochemical laboratory analysis number:	2014-020	2014-025	
	Measured uranium concentration (µg/ml):	2.58E+00	1.02E-01	
	Uncertainty in uranium concentration (µg/ml):	2.58E-01	1.02E-02	
	Weight uranium leached (g):	3.84E-04	1.29E-05	3.97E-04
	Uncertainty in weight uranium leached (g):	3.85E-05	1.29E-06	3.85E-05
	Effective number of exposed kernels:	1.0	0.0	1.0
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 6.14	< 5.19	<11.33
	Weight of impurity in blank (µg):	< 7.37	< 5.27	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.14	5.19	11.33
Cr	Measured concentration of impurity in sample (µg/ml):	5.20E-03	3.04E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.77	0.38	1.16
	Weight of impurity in blank (µg):	< 0.36	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.42	0.13	0.54
	Maximum corrected weight of impurity in sample (µg):	0.77	0.38	1.16
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.28	< 0.24	< 0.53
	Weight of impurity in blank (µg):	< 0.34	< 0.24	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.24	0.53
Co	Measured concentration of impurity in sample (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.24	< 0.20	< 0.45
	Weight of impurity in blank (µg):	< 0.29	< 0.21	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.20	0.45
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.19	< 1.01	< 2.20
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.19	1.01	2.20
Ca	Measured concentration of impurity in sample (µg/ml):	4.94E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	73.61	<12.60	<86.21
	Weight of impurity in blank (µg):	137.11	<12.80	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.00	12.60	12.60
Al	Measured concentration of impurity in sample (µg/ml):	3.82E-01	8.26E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	56.92	10.41	67.33
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	55.49	9.38	64.87
	Maximum corrected weight of impurity in sample (µg):	56.92	10.41	67.33
Ti	Measured concentration of impurity in sample (µg/ml):	2.18E-02	1.47E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	3.25	1.85	5.10
	Weight of impurity in blank (µg):	< 1.43	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	1.82	0.83	2.64
	Maximum corrected weight of impurity in sample (µg):	3.25	1.85	5.10
V	Measured concentration of impurity in sample (µg/ml):	2.37E-01	5.02E-02	**V**
	Uncorrected weight of impurity in sample (µg):	35.31	6.33	41.64
	Weight of impurity in blank (µg):	< 0.36	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	34.96	6.07	41.02
	Maximum corrected weight of impurity in sample (µg):	35.31	6.33	41.64

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-26A: Measurement of U Contamination or Impurities by Deconsolidation Leach

Procedure:	AGR-CHAR-DAM-26 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	Deconsolidation Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU07-OP1-Z_DRF26R1_05.xls

Mean average weight uranium per particle (g):	3.93E-04
Uncertainty in mean average weight uranium per particle (g):	6.56E-07

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09061803	L09062203	
	Number of compacts:	None		
	Total volume of leach solution (ml):	179.0	128.0	
	Radiochemical laboratory analysis number:	2014-018	2014-023	
	Measured uranium concentration (µg/ml):	5.80E-04	<5.00E-04	
	Uncertainty in uranium concentration (µg/ml):	5.80E-05		
	Weight uranium leached (g):	1.04E-07	<6.40E-08	<1.68E-07
	Uncertainty in weight uranium leached (g):	1.04E-08		
	Effective number of exposed kernels:	0.0	0.0	0.0
	Uncertainty in effective number of exposed kernels:	0.0		
Fe	Measured concentration (µg/ml):	< 4.12E-02	< 4.12E-02	**Fe**
	Total weight of leached impurity (µg):	< 7.37	< 5.27	<12.65
Cr	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	**Cr**
	Total weight of leached impurity (µg):	< 0.36	< 0.26	< 0.61
Mn	Measured concentration (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Total weight of leached impurity (µg):	< 0.34	< 0.24	< 0.59
Co	Measured concentration (µg/ml):	< 1.62E-03	< 1.62E-03	**Co**
	Total weight of leached impurity (µg):	< 0.29	< 0.21	< 0.50
Ni	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Total weight of leached impurity (µg):	< 1.43	< 1.02	< 2.46
Ca	Measured concentration (µg/ml):	7.66E-01	< 1.00E-01	**Ca**
	Total weight of leached impurity (µg):	137.11	<12.80	<149.91
Al	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	**Al**
	Total weight of leached impurity (µg):	< 1.43	< 1.02	< 2.46
Ti	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	**Ti**
	Total weight of leached impurity (µg):	< 1.43	< 1.02	< 2.46
V	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	**V**
	Total weight of leached impurity (µg):	< 0.36	< 0.26	< 0.61

Comments

Checked against official results of analyses for RMAL2014 by FCM on 7/23/2009

Fred C. Montgomery
Operator

7-23-09
Date

Data Report Form DRF-27: Counting of Particles with a Defective OPyC Layer from Deconsolidated Compacts by Visual Inspection

Procedure:	AGR-CHAR-DAM-27 Rev. 0
Operator:	Fred Montgomery
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID number:	079
DRF filename:	\\mc-agr\AGR\DefectiveOPyC\LEU07-OP1-Z_DRF27R0.xls

Number of particles with cracked OPyC:	0
Number of particles with partially missing OPyC:	0
Number of particles with completely missing OPyC:	0
Total number of particles with defective OPyC:	0

Comments on unusual visual characteristics of OPyC

Found 1 particle with a few shallow indents which did not penetrate through the OPyC.
Found 1 particle which has a gouge along the surface of the OPyC.

Fred C. Montgomery
Operator

7-2-09
Date

Data Report Form DRF-28: Counting of Particles with Excessive Uranium Dispersion Inside SiC

Procedure:	AGR-CHAR-DAM-28 Rev. 2
Operator:	John Hunn/Ivan Dunbar/Paul Menchhofer/Jason Ramey
Compact lot ID:	LEU07-OP1-Z
Compact lot description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A
Compact ID numbers:	060 046 122 146 130 141 138 111 064 053 023 076 006 040 034 139 083 087 145 049
DRF filename:	\\mc-agr\AGR\DefectiveIPyC\LEU07-OP1-Z_DRF28R2.xls

Number of compacts from which particles were recovered:	20

Weight of sample of particles (g):	53.159
Number of particles in sample:	63538
Mean average weight/particle (g):	8.37E-04

Number of particles with excessive U dispersion:	443

Comments

Severity of uranium dispersion as imaged by x-ray radiography varied. Many particles showed severe dispersion in buffer region, with uranium usually piled up at buffer/IPyC interface, but sometimes appearing to extend into IPyC.

John Hunn — Operator

12-7-09 — Date

For Information Only

The information in the remainder of this section is from additional characterization that was not required by the fuel product specification.

Anisotropy of pyrocarbon layers after compacting

To examine the change in pyrocarbon anisotropy during compact fabrication, particles were recovered after deconsolidation of the particles from the compact for defective OPyC analysis. After compacting, the anisotropy of the pyrocarbon layers was observed to increase. This increase occurs during the heat treatment of the compacts at 1800°C for 1 hour. The diattenuation of the IPyC increased from 0.0118±0.0006 to 0.0150±0.0006 (1.0355±0.0019 to 1.0451±0.0019 in terms of effective BAFo). The diattenuation of the OPyC increased from 0.0081±0.0003 to 0.0129±0.0007 (1.0242±0.0008 to 1.0388±0.0021 in terms of effective BAFo). The following data report forms contain the data for these measurements.

Data Report Form DRF-18A: Measurement of Pyrocarbon Anisotropy using the 2-MGEM - IPyC

Procedure:	AGR-CHAR-DAM-18 Rev. 1
Operator:	G. E. Jellison
Mount ID:	M09111301
Sample ID:	LEU07-OP1-Z079
Sample Description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A, after compacting
Folder containing data:	\\mc-agr\AGR\2-MGEM\R09112501\

Particle #	Grid Position	Diattenuation			Equivalent BAFo = 1+3N		
		Average	St. Dev.	Ave. Error	Average	St. Dev.	Ave. Error
1	4,4	0.0154	0.0023	0.0008	1.0462	0.0069	0.0024
2	4,5	0.0147	0.0024	0.0008	1.0441	0.0072	0.0024
3	4,6	0.0146	0.0046	0.0009	1.0438	0.0138	0.0027
4	5,4	0.0154	0.0029	0.0008	1.0462	0.0087	0.0024
5	5,5	0.0147	0.0023	0.0008	1.0441	0.0069	0.0024
6	5,6	0.0160	0.0029	0.0008	1.0480	0.0087	0.0024
7	6,4	0.0150	0.0028	0.0009	1.0450	0.0084	0.0027
8	6,5	0.0160	0.0026	0.0008	1.0480	0.0078	0.0024
9	6,6	0.0143	0.0023	0.0009	1.0429	0.0069	0.0027
10	5,7	0.0142	0.0021	0.0009	1.0426	0.0063	0.0027
Average		0.0150	0.0027	0.0008	1.0451	0.0082	0.0025

Mean of average BAFo per particle:	1.0451
Standard deviation of average BAFo per particle:	0.0019

Comments

G. E. Jellison
Operator

12/16/09
Date

Data Report Form DRF-18B: Measurement of Pyrocarbon Anisotropy using the 2-MGEM - OPyC

Procedure:	AGR-CHAR-DAM-18 Rev. 1
Operator:	G. E. Jellison
Mount ID:	M09111301
Sample ID:	LEU07-OP1-Z079
Sample Description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A, after compacting
Folder containing data:	\\mc-agr\AGR\2-MGEM\R09112501\

Particle #	Grid Position	Diattenuation			Equivalent BAFo = 1+3N		
		Average	St. Dev.	Ave. Error	Average	St. Dev.	Ave. Error
1	4,4	0.0137	0.0027	0.0010	1.0411	0.0081	0.0030
2	4,5	0.0132	0.0028	0.0010	1.0396	0.0084	0.0030
3	4,6	0.0133	0.0029	0.0012	1.0399	0.0087	0.0036
4	5,4	0.0135	0.0032	0.0011	1.0405	0.0096	0.0033
5	5,5	0.0113	0.0025	0.0010	1.0339	0.0075	0.0030
6	5,6	0.0131	0.0026	0.0011	1.0393	0.0078	0.0033
7	6,4	0.0126	0.0028	0.0011	1.0378	0.0084	0.0033
8	6,5	0.0134	0.0027	0.0010	1.0402	0.0081	0.0030
9	6,6	0.0124	0.0026	0.0010	1.0372	0.0078	0.0030
10	5,7	0.0127	0.0025	0.0011	1.0381	0.0075	0.0033
Average		0.0129	0.0027	0.0011	1.0388	0.0082	0.0032

Mean of average BAFo per particle:	1.0388
Standard deviation of average BAFo per particle:	0.0021

Comments

G. E. Jellison
Operator

12/16/09
Date

Data Report Form DRF-18A: Measurement of Pyrocarbon Anisotropy using the 2-MGEM - IPyC

Procedure:	AGR-CHAR-DAM-18 Rev. 1
Operator:	G. E. Jellison
Mount ID:	M09111301
Sample ID:	LEU07-OP1-Z079
Sample Description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A, after compacting
Folder containing data:	\\mc-agr\AGR\2-MGEM\R09112501\

Particle #	Grid Position	Diattenuation			True BAFo = (1+N)/(1-N)		
		Average	St. Dev.	Ave. Error	Average	St. Dev.	Ave. Error
1	4,4	0.0154	0.0023	0.0008	1.0313	0.0047	0.0017
2	4,5	0.0147	0.0024	0.0008	1.0298	0.0049	0.0016
3	4,6	0.0146	0.0046	0.0009	1.0296	0.0095	0.0019
4	5,4	0.0154	0.0029	0.0008	1.0313	0.0060	0.0017
5	5,5	0.0147	0.0023	0.0008	1.0298	0.0047	0.0016
6	5,6	0.0160	0.0029	0.0008	1.0325	0.0060	0.0017
7	6,4	0.0150	0.0028	0.0009	1.0305	0.0058	0.0019
8	6,5	0.0160	0.0026	0.0008	1.0325	0.0054	0.0017
9	6,6	0.0143	0.0023	0.0009	1.0290	0.0047	0.0019
10	5,7	0.0142	0.0021	0.0009	1.0288	0.0043	0.0019
Average		0.0150	0.0027	0.0008	1.0305	0.0056	0.0017

Mean of average BAFo per particle:	1.0305
Standard deviation of average BAFo per particle:	0.0013

Comments

G. E. Jellison
Operator

12/16/09 G.E.J.
12/09/0
Date

Data Report Form DRF-18B: Measurement of Pyrocarbon Anisotropy using the 2-MGEM - OPyC

Procedure:	AGR-CHAR-DAM-18 Rev. 1
Operator:	G. E. Jellison
Mount ID:	M09111301
Sample ID:	LEU07-OP1-Z079
Sample Description:	AGR-2 UCO Baseline Fuel, from G73J-14-93072A, after compacting
Folder containing data:	\\mc-agr\AGR\2-MGEM\R09112501\

Particle #	Grid Position	Diattenuation			True BAFo = (1+N)/(1-N)		
		Average	St. Dev.	Ave. Error	Average	St. Dev.	Ave. Error
1	4,4	0.0137	0.0027	0.0010	1.0278	0.0056	0.0021
2	4,5	0.0132	0.0028	0.0010	1.0268	0.0058	0.0021
3	4,6	0.0133	0.0029	0.0012	1.0270	0.0060	0.0025
4	5,4	0.0135	0.0032	0.0011	1.0274	0.0066	0.0023
5	5,5	0.0113	0.0025	0.0010	1.0229	0.0051	0.0020
6	5,6	0.0131	0.0026	0.0011	1.0265	0.0053	0.0023
7	6,4	0.0126	0.0028	0.0011	1.0255	0.0057	0.0023
8	6,5	0.0134	0.0027	0.0010	1.0272	0.0055	0.0021
9	6,6	0.0124	0.0026	0.0010	1.0251	0.0053	0.0021
10	5,7	0.0127	0.0025	0.0011	1.0257	0.0051	0.0023
Average		0.0129	0.0027	0.0011	1.0262	0.0056	0.0022

Mean of average BAFo per particle:	1.0262
Standard deviation of average BAFo per particle:	0.0014

Comments

G. E. Jellison
Operator

12/16/09
Date

Appendix A: Certificate of Conformance

This section contains the Certificate of Conformance for the LEU07-OP1-Z compact lot, This is a record of the review by Quality Assurance personnel that specified requirements have been met or that nonconformances to those requirements have been documented. Appendix B contains copies of the applicable Nonconformance Reports.

Oak Ridge National Laboratory
Advanced Gas Reactor Fuel Development and Qualification Program
CERTIFICATE OF CONFORMANCE

1. ITEM IDENTIFICATION: AGR Fuel Compacts
2. PART LOT AND LOT NUMBER: AGR-2 UCO Baseline, LEU07-OP1-Z
3. PRODUCT DEFINITION: INL Document #SPC-923, Revision 3 entitled *AGR-2 Fuel Specification*
4. LIST OF APPROVED DEVIATIONS: Not applicable

*Part Type	Unique Part I.D. No.	QTY	INIT.	Date	*Part Type	Unique Part I.D. No.	QTY	INIT.	Date
FC	003	1	MCV	12/23/09	FC	081	1	MCV	12/23/09
FC	004	1			FC	082	1		
FC	007	1			FC	084	1		
FC	008	1			FC	089	1		
FC	012	1			FC	093	1		
FC	014	1			FC	094	1		
FC	015	1			FC	098	1		
FC	016	1			FC	102	1		
FC	019	1			FC	105	1		
FC	020	1			FC	106	1		
FC	021	1			FC	109	1		
FC	036	1			FC	113	1		
FC	041	1			FC	116	1		
FC	043	1			FC	117	1		
FC	054	1			FC	118	1		
FC	063	1			FC	121	1		
FC	065	1			FC	126	1		
FC	067	1			FC	128	1		
FC	068	1			FC	131	1		
FC	071	1			FC	132	1		
FC	072	1			FC	137	1		
FC	073	1			FC	143	1		
FC	074	1			FC	148	1		
FC	080	1			FC	151	1		

5. LIST OF APPLICABLE NONCONFORMANCE REPORT NUMBERS (NCRs attached in Appendix B of data package): NCR-X-MSTD-AGR-10-01, INL NCR 44791, INL NCR 44792

With the exception of the Deviations documented on the forms referenced in Item 4 and the nonconforming conditions documented on Nonconformance Reports referenced in Item 5, the listed parts have been produced and tested in compliance to the requirements of the QAP for the AGR Program at ORNL (Document # QAP-ORNL-AGR-01), its subordinate implementing procedures, and to the specified product definition prescribed in the document(s) referenced in Item 3.

MCV — 12/23/09

M. C. Vance, AGR Quality Representative,
Materials Science and Technology Division, ORNL — Date

* FC indicates fuel compact

Appendix B: Nonconformance Reports

This section contains the applicable Nonconformance Reports for the LEU07-OP1-Z compact lot. A nonconformance related to compact length was determined to be acceptable. However, a higher than allowed fraction of exposed uranium was determined to not be acceptable for the AGR-2 irradiation test. The exposed uranium was due to cracked TRISO layers in the coated particle composite. These cracks are thought to have occurred at B&W when particles were removed from the coating furnace using a suction device. In addition, a higher than allowed IPyC defect fraction was determined to not be acceptable for the AGR-2 irradiation test. Excessive permeability of chlorine through the IPyC during SiC deposition was evident from x-ray observation of uranium dispersion out of the kernel and into the buffer after particles experienced 1800°C heat treatment in the final stage of compacting. The final disposition of this compact lot was to not use the compacts for the AGR-2 irradiation test, but to retain the compacts in storage at ORNL and INL for possible future analysis or methods development. This disposition was documented on INL NCR-44791 and INL NCR-44792.

ORNL NONCONFORMANCE REPORT (NCR)

1.a. ATS TRACKING NUMBER:	2. DIVISION / ORGANIZATION	3. SUBCONTRACT #	4. PROJECT TITLE / JOB #
1.b. NCR - X-MSTD-AGR-10-01	Materials Sci. & Tech.	N/A	AGR Program
5. HOLD/REJECT TAG # / SEGREGATION AREA	**6. IDENTIFICATION DATE**	**7. IDENTIFIER**	
N/A - tracking by NCR number	February 27, 2009 & April 17, 2009	Ivan Dunbar	

8. Type: ☐ Construction ☑ In-House Fabricated ☐ Procedural ☐ Vendor Supplied ☐ Industrial Safety ☐ Other

9. RESPONSIBLE PERSON	10. EQUIPMENT / PART / ITEM NAME	11. BUILDING
John Hunn	LEU06-OP1-Z, LEU07-OP1-Z compacts	4508
12. FACILITY SYSTEM	**13. SUPPLIER**	**14. REQUIREMENT SOURCE**
N/A	N/A	AGR-2 Fuel Spec. INL/SPC-923, Rev. 3

15. SPECIFIED REQUIREMENT

Compact length: none less than 25.02 mm or greater than 25.40 mm

16. NONCONFORMANCE

Four compacts outside critical limits.

LEU06-OP1-Z005 (25.003 mm long)
LEU06-OP1-Z044 (25.015 mm long)
LEU06-OP1-Z087 (24.888 mm long)
LEU06-OP1-Z099 (25.436 mm long)

One compact outside critical limits.

LEU07-OP1-Z123 (25.446 mm long)

17. EVALUATION, REMEDIAL ACTION, AND TECHNICAL JUSTIFICATION

Compacts were processed within process limits provided in referenced specification and according to approved and tested procedure. However, existing hydraulic press offered insufficient control to produce the desired number of compacts (135 for LEU06-OP1-Z and 155 for LEU07-OP1-Z), with all compacts within the specified length limits. Insufficient nature of hydraulic press had been previously noted by compacting expert on NCR-X-AGR-06-03, with recommendation that improved equipment would minimize the probability of producing compacts with this non-conformance. However, the impact of continued use of the existing press was deemed acceptable to the program under the existing budget limitations. An electric servomotor press capable of more reliable control of compact length has recently been acquired and used successfully to produce three additional compact lots for the AGR-2 irradiation campaign with all compacts within the specified length limits and with a significantly reduced standard deviation in the measured length, indicative of the improved process control.

No adverse results are anticipated from using the listed non-conforming compacts for irradiation, acceptance testing or other uses. Observed deviations in length are negligible. Recommended disposition is to use as is.

18. SUPPLIER PROPOSED DISPOSITION

SIGNATURE/DATE John Hunn, ORNL AGR Project Manager John Hunn 12-23-09

19. NONCONFORMANCE DISPOSITION

☑ Accept/Use-As-Is ☐ Approved for Alternate Use ☐ Repair to Useable Condition ☐ Rework to Spec. ☐ Return to Vendor ☐ Scrap

20. SUBJECT MATTER EXPERT, DATE	21. RESPONSIBLE PERSON, DATE	22. QAS/QAC/QM, DATE
John Hunn John Hunn 12-23-09	John Hunn John Hunn 12-23-09 David Petti 12-23-09 for DAP	Mark Vance 12/23/09

23. DESIGN DRAWINGS, SPECS, OR PROCEDURE CHANGES? ☐ Yes If yes, list below: ☑ No	24. USQD REQUIRED? ☐ Yes ☑ No
DESIGN AUTHORITY OR SYSTEM ENG., DATE N/A	SAFETY ANALYST, DATE N/A

25. PAAA OFFICE SCREENING? ☑ Yes ☐ No	26. ☑ ACTUAL ☐ ESTIMATED COST	27. PROBABLE CAUSE CODE
SIGNATURE,DATE 12/23/09	No additional cost associated with this disposition	4C

REMEDIAL ACTION COMPLETION

28. RESPONSIBLE PERSON OR VERIFIER	29. TARGET DATE	30. DATE CLOSED
N/A No further remedial action planned	N/A	N/A

ORNL NONCONFORMANCE REPORT INSTRUCTIONS

The NCR Form shall be completed by the Responsible Person or designee.
Enter "N/A" in fields not used. **Required fields are identified by *.**

1.a. ***Assessment Tracking System – ATS** – Automatic number supplied by the ATS.
1.b. ***Nonconformance Report – NCR** – Number assigned by the appropriate Division/Organization (eg., NCR-02-DIV-XXX).
2. **Division/Organization** — Name or division/organization/program responsible for the NCR.
3. **Subcontract # -** For procured items, enter the subcontract or purchase order number
4. **Project Title/Job Number** — Project title or job number as reflected on drawings, specifications, or other documentation associated with the nonconformance.
5. **Hold/Reject Tag #/Segregation Area** — Enter the hold or reject tag number and/or identify the segregation area, as applicable.
6. **Identification Date** — Date the nonconformance was identified.
7. ***Identifier** – Name of person initially identifying nonconformance.
8. ***Type** – Check the type of nonconformance.
9. ***Responsible Person – RP -** The ORNL line or project personnel responsible for control or use of the item, material or Service in question. The RP is responsible for ensuring analysis and disposition is completed.
10. **Equipment/Part/Item Name** — Equipment, part or item name as reflected on drawings, specifications, or other documentation.
11. **Building –** Building number.
12. **Facility System** – Provide name of facility system.
13. **Supplier** – Name of vendor, shop, subcontractor, customer, fabricator, or other source supplying nonconforming item, material or service deliverable.
14. ***Requirement Source -** Indicate the drawings, specifications, procedures, statement of work or subcontract associated with the nonconforming equipment, part, item or service deliverable.
15. ***Specified Requirements** — Identify the requirements associated with the nonconforming condition.
16. ***Nonconformance -** Identify the nonconforming condition in detail, with equipment numbers and/or other unique identifiers to clearly identify the equipment, part, item, or service, as applicable.
17. ***Evaluation, Remedial Action, and Technical Justification** — State the justification for the disposition selected and the remedial action(s) to be taken to make the equipment, part, or item usable. If "use-as-is" or "repair" is determined, then include a technical justification. Identify individual(s) responsible for any remedial actions
18. **Supplier Proposed Disposition Signature** – Signature of the supplier representative proposing a disposition for ORNL's approval, if applicable.
19. ***Nonconformance Disposition** — Check the nonconformance disposition.
20. **Subject Matter Expert – SME** – Signature if SME was used in determining disposition
21. ***Responsible Person – RP** – Signature of the ORNL line or project person responsible for control or use of the of item, material or service subcontract. Signature indicates "approval" of the proposed disposition
22. ***QAS/QAC/QM** – Signature of quality representative indicating concurrence with the disposition and that the NCR process was followed.
23. **Design drawings, specifications, or procedure changes** — List any documents requiring revision. For nuclear facilities only, check and obtain dated signature of design engineer or system engineer.
24. **Unresolved Safety Question Determination - USQD** – Check and obtain dated signature of safety analyst, if required. (Nuclear Facilities Only)
25. ***Price Anderson Amendments Act – P-AAA Screening** – Check yes or no based on screening conducted in Step 5 of procedure. Include signature of the person performing the evaluation.
26. **Estimated Cost –** Estimated or actual cost impact of nonconformance. Identify if the entry is "actual" or "estimated".

27. **Probable Cause Code** – Cause Code Selected from ATS:

1 - **Equipment/Material Problem**. An event or condition resulting from the failure, malfunction, or deterioration of equipment or parts, including instruments or material.

1A - Defective or Failed Part. A part/instrument that lacks something essential to perform its intended function.

1B - Defective or Failed Material. A material defect or failure.

1C - Defective Weld, Braze, or Soldered Joint. A specific weld/joint defect or failure.

1D - Error by Manufacturer in Shipping or Marking. An error by the manufacturer or supplier in the shipping or marking of equipment.

1E - Electrical or Instrument Noise. An unwanted signal or disturbance that interferes with the operation of equipment.

1F - Contaminant. Failure or degradation due to radiation damage or foreign material such as dirt, crud, or impurities.

1G - End of Life Failure. A failure where the equipment or material is run to failure and has reached its end of design life.

2 - Procedure Problem. An event or condition that can be traced to the lack of a procedure, an error in a procedure, or a procedural deficiency or inadequacy.

2A - Defective or Inadequate Procedure. A procedure that either contains an error or lacks something essential to the successful performance of the activity.

2B - Lack of Procedure. No written procedure was in place to perform the activity.

3 - Personnel Error. An event or condition due to an error, mistake, or oversight.

3A - Inattention to Detail. Inadequate attention to the specific details of the task.

3B - Procedure Not Used or Used Incorrectly. The failure to use or the inappropriate use of written instructions, procedures, or other documentation.

3C - Communication Problem. Inadequate presentation or exchange of information.

3D - Other Human Error. Human error other than those described above.

4 - Design Problem. An event or condition that can be traced to a defect in design or other factors related to configuration, engineering, layout, tolerances, calculations, etc.

4A - Inadequate Work Environment. Inadequate design of equipment used to communicate information from the facility to a person (e.g., displays, labels, etc.) as well as inadequate work environment, such as inadequate lighting, working space, or other human factor considerations.

4B - **Inadequate or Defective Design**. A design in which something essential was lacking (defective) or when a detail was included but was not adequate for the requirement (inadequate).

4C - Error in Equipment or Material Selection. A mistake in the equipment or material selection only, not to include a procurement error (see Personnel Error - (e) Other Human Error) or a specification error (see Design Problem - (d) Drawing, Specification, or Data Errors).

4D - Drawing, Specification, or Data Errors. An error in the calculation, information, or specification of a design.

5 - Training Deficiency. An event or condition that can be traced to a lack of training or insufficient training to enable a person to perform a desired task adequately.

5A - No Training Provided. A lack of appropriate training.

5B - Insufficient Practice or Hands-On Experience. An inadequate amount of preparation before performing the activity.

5C - Inadequate Content. The knowledge and skills required to perform the task or job were not identified.

5D - Insufficient Refresher Training. The frequency of refresher training was not sufficient to maintain the required knowledge and skills.

5E - Inadequate Presentation or Materials. The training presentation or materials were insufficient to provide adequate instruction.

6 - Management Problem. An event or condition that can be directly traced to managerial actions or methods.

6A - Inadequate Administrative Control. A deficiency in the controls in place to administer and direct activities.

6B - Work Organization/Planning Deficiency. A deficiency in the planning, scoping, assignment, or scheduling of work.

6C - Inadequate Supervision. Inadequate techniques used to direct workers in the accomplishment of tasks.

6D - Improper Resource Allocation. Improper personnel or material allocation resulting in the inability to successfully perform assigned tasks.

6E - Policy Not Adequately Defined, Disseminated, or Enforced. Inadequate description, distribution, or enforcement of policies and expectations.

6F - Other Management Problem. A management problem other than those defined above.

7 - External Phenomena. An event or condition caused by factors that are not under the control of the reporting organization or the suppliers of the failed equipment or service.

7A - Weather or Ambient Condition. Unusual weather or ambient conditions, including hurricanes, tornadoes, flooding, earthquake, and lightning.

7B - Power Failure or Transient. Special cases of power loss that are attributable to outside supplied power.

7C - External Fire or Explosion. An external fire, explosion, or implosion.

7D - Theft, Tampering, Sabotage, or Vandalism. Theft, tampering, sabotage, or vandalism that could not have been prevented by the reporting organization.

8 - Radiological/Hazardous Material Problem. An event related to radiological or hazardous material contamination that cannot be attributed to any of the other causes.

8A - Legacy Contamination. Radiological or hazardous material contamination attributed to past practices.

8B - Source Unknown. Radiological or hazardous material contamination where the source cannot be reasonably determined.

28. **Responsible Person or Verifier** – Signature closes the NCR and releases the nonconforming item/material/service for further processing.
29. **Target Date** – Scheduled date for closure of NCR remedial actions..
30. **Date closed** – Actual date closed.

230.01
Revision date
09/30/2003

Control of Nonconforming Items
Nonconformance Documentation

Initiator:	S Number:	Work Org.:	Work Phone:
Barnes, Charles M	059914	C700	6-0864

Documentation

NCR Number:	Date Identified:	*SSC:	*Facility:OFF-S
44791	08/04/2009	AGR-2 compacts and coated particles	*Location:ORNL Description:Bldg 4508 and possibly other ORNL buildings

*Item Name:	Req. No/P.O. No./SC and/or Project No.:
LEU06 compacts containing B&W G73J-14-93074A particles and other AGR-2 compact lots (LEU07 and possibly LEU09 and/or LEU11) containing B&W AGR-2 particles	Project #23841; Contract #27240 with B&W for industrial fuel fabrication and development; Contract 59613 with ORNL which includes AGR compact fabrication and characterization
Supplier Name/Address: Supplier of AGR-2 particles is Babcock & Wilcox Co., 1570 Mt. Athos Road, Lynchburg, VA 24504	*This NCR is for: ☐ ICP ☒ INL ☐ Other

*Is the non-conformance under the requirement of SNF or NRC-licensed activities (DOE/RW-0333P)? ○ Yes ● No

*Specification to which Item does not perform:

SPC-923, Rev. 2 AGR-2 Fuel Specification (in effect when AGR-2 UCO particle data package was submitted by B&W) and SPC-923, Rev 3 (in effect when LEU06 and other AGR-2 compacts were characterized)

Associated Documents:
Data Packages for LEU06, LEU07, LEU09 and LEU11 compacts (not issued at this time); B&W Data Packages for AGR-2 UCO particles, lots G73J-14-93071A, G73J-14-93072A, G73J-14-93073A, G73J-14-93074A & G73H-10-93085B; TCT meeting notes of March 2 & 5 teleconferences, March 16 & 18 teleconferences, and April 2 teleconference

*Non-Conformance Description:

LEU06 compacts were found to contain uranium contamination at approximately 10-4 g exposed U per gram total U in compacts, compared to the specification of ≤ 2x10-5 g exposed U per g U in compacts. Exposed uranium in compacts was determined to be caused by cracks through all layers of the coatings of a fraction of particles contained in these compacts. Based on several teleconferences of the VHTR TDO Fuels Technical Coordination Team (held on March 2, 5, 16, 18 and April 2), it was recommended that LEU06 compacts not be used in the AGR-2 experiment because of the high uranium contamination but replaced by a new set of compacts containing G73J-14-93073A particles. This replacement batch of compacts is expected to have a lower fraction of uranium contamination (44% of the LEU06 fraction based on all leach and burn leach results and 95% confidence values or 33% based on all leach and burn leach results and 50% confidence values). LEU07 compacts were also found to have uranium contamination above the specification limit, although for a separate reason (uranium dispersion), LEU07 compacts have been rejected for use in the AGR-2 experiment. The actual uranium contamination values for LEU06 compacts are ≤1.4E-4 (95% confidence based on analysis of 40 compacts only) for LEU06 and ≤6.9x10-5 (95% confidence based on analysis of 100 compacts) for LEU07 compacts. The expected value for LEU09 compacts is 5x10-5 (95% confidence), based on measurements of defect fractions of 217,000 particles from batch 93073A.

*Responsible Manager (RM):	*Responsible Quality Engineer (QE):
Cox, John R Alternate RM for processing NCR: Croson, Diane V	Roberts, Gary D

Next Activity: Implementation Completion - RM
Actionee: Croson, Diane V
Date Due:

Screening - Responsible Manager

Responsible Manager (RM):	Organization	Phone:	Date Screened:
Croson, Diane V	C700	6-3402	12/08/2009

*Initiator has selected "No" to the non-conformance under the requirement of SNF or NRC-licensed activities

(DOE/RW-0333P). Is this Correct?
● Yes ○ No

*Does the NCR require Stop Work?
○ Yes ● No

*Does this NCR support Environmental Requirements? ○ Yes ● No

RM Comments:
None

RM Change History:
12/08/2009 07:26 AM : Angela J Smith changed the RM from Cox, John R to Croson, Diane V

Screening - Quality Engineer

Quality Engineer (QE):	Organization	Phone:	Date Screened:
Roberts, Gary D	W560	6-8961	12/08/2009

*Is the NCR valid? ● Yes ○ No

Quality Comments:
None

Notification - RM

Responsible Manager (RM):	Organization	Phone:	Date Notified:
Croson, Diane V	C700	6-3402	12/08/2009

ORPS Report Number:
N/A

*Is the NCR operational equipment needed for Conditional Use?
○ Yes ● No

*Area of Responsibility:
INL NGNP

Optional Internal Area of Responsibility:

Cognizant Director:
Soto, Rafael
Cognizant Director's Alternate(s):
Smith, Angela J; Armour, Kimberly Jo

*Facility Manager:
Petti, David A

Compliance Coordinator(s) to determine Price Anderson (PAAA) noncompliance:
Smith, Angela J

*Does the non-conformance involve suspect/counterfeit items?
○ Yes ● No

*Does this NCR pertain to Waste Containers, Waste Packaging, or Packaging and Transportation activities? ○ Yes ● No

Method of Segregation:
Material is located at ORNL and is segregated from other fuel batches to prevent inadvertant use

Method of Identification:
Clearly lable by batch number

*Lead Disposition Evaluator:
Barnes, Charles M
Additional Disposition Evaluator(s):
(These evaluators verify and concur the disposition of NCR.)

This block is intentionally left blank.

Additional Notification:

QE Red Tag Process

Quality Engineer (QE):	Organization	Phone:	Date Processed:
Roberts, Gary D	W560	6-8961	07/30/2009

Tagging Information/Other Methods:

Other means of Tag Identification:

Disposition

Lead Disposition Evaluator:	Organization:	Phone:	Date Disposition sent for approval:
Barnes, Charles M	C700	6-0864	12/08/2009

*NCR Disposition:
○ Use As Is ○ Reject
○ Repair ● Multiple Disposition
○ Rework

*Multiple Disposition Documentation:
1. LEU06 and LEU07 compacts: Do not use for AGR-2 fuel because of high uranium contamination. However, because full characterization has been performed on these compacts and the kernels and coated particles that they contain, LEU06

	compacts should be retained in storage at INL and ORNL for possible future uses. These uses include measurement of thermal conductivity or other compact properties, tests of PIE methods, and tests to better determine fuel specification limits. 2. LEU09 and LEU11 compacts: Use as is. See justification below.
*Does Disposition represent Design Change? ○ Yes ● No	*Does this item require a Unreviewed Safety Question (USQ) screening and evaluation? ○ Yes ● No

Identify as-built drawings and other documentation:(*For Use-As-Is and Repair)
N/A

Method of Disposal:(*For Reject)
N/A

Technical Justification:(*For Use-As-Is and Repair)
Justification for use as is for LEU09 and LEU11 compacts: Uranium equivalent to 2 defective particles has been found in 60 LEU09 compacts; this level is low enough to permit use of these compacts in the AGR-2 experiment, although the level may not meet the fuel uranium contamination specification limit. The final determination of whether LEU09 compacts meet the uranium contamination specification will be made after analyses are complete of another 40 compacts. No uranium contamination has been found in the analysis of 40 LEU11 compacts. 60 additional LEU11 compacts are being analyzed. Past analyses of multiple sets of 20 compacts show very little variation in results from one set to the next because of the large number of particles in each set of 20 compacts.

Technical requirements and acceptance criteria to be used for repair work:
N/A

Inspections and Verification Criteria for acceptability of repair or rework:
N/A

Other Documents or QA records requiring the change:
N/A

If this nonconforming item is associated with, or caused by, a program, procedure, or process problem, document the issue in accordance with LWP-13840:

N/A

Disposition Concurrence/Approval

Approval RM(Signature)	Concurrence/Approval QE(Signature)	This block is intentionally left blank.	This block is intentionally left blank.
Croson, Diane V *Diane V Croson* 12/08/2009	Roberts, Gary D *Gary D Roberts* 12/08/2009		

Implementation Completion - RM

Responsible Manager (RM):	Organization	Phone:	Date Completion:
Croson, Diane V	C700	6-3402	

The Disposition as approved has been completed and implemented: ○ Yes ○ N/A

Implementing Documentation:

Attachments/Comments

PAAA 44791 (AGR-2 compacts).pdf

Revision History

12/08/2009 04:30 PM : Diane V Croson as an RM concurred the Disposition and signed off.
12/08/2009 04:20 PM : Gary D Roberts as a QE concurred the Disposition and signed off.
12/08/2009 02:37 PM : Charles M Barnes completed NCR Disposition and submitted to Croson, Diane V; Roberts, Gary D for their concurrence and approval.
12/08/2009 07:52 AM : Diane V Croson completed Notification Process and notified Roberts, Gary D; Soto, Rafael; Smith, Angela J; Armour, Kimberly Jo; Smith, Angela J; Petti, David A; Barnes, Charles M
12/08/2009 07:44 AM : Gary D Roberts completed screening and forwarded to Croson, Diane V for Notification process.
12/08/2009 07:34 AM : Diane V Croson completed screening and forwarded to Roberts, Gary D for QE Screening.
12/08/2009 07:26 AM : Angela J Smith changed the RM from Cox, John R to Croson, Diane V
08/04/2009 03:26 PM : Charles M Barnes submitted NCR to RM Cox, John R for screening.

The following fields are general purpose public use. Any data entered here is not related to NCR process and solely used for one's individual need. Integrity of the data is not guarantied since it can be replaced by any user randomly.

FIELD A:

(Field Name: FIELDA, type Text)

FIELD B:

(Field Name: FIELDb, type Text)

230.01
Revision date
09/30/2003

Control of Nonconforming Items
Nonconformance Documentation

Initiator:	S Number:	Work Org.:	Work Phone:
Barnes, Charles M	059914	C700	6-0864

Documentation

NCR Number:	Date Identified:	*SSC:	*Facility:OFF-S *Location:ORNL Description:Bldg 4508 and possibly other ORNL buildings
44792	08/04/2009	AGR-2 UCO baseline coated particles and compacts	

*Item Name:	Req. No/P.O. No./SC and/or Project No.:
AGR-2 UCO baseline particles (93071A and 93072A); also LEU07 compacts which contain 93072A particles	Project #23841; Contract #27240 with B&W for Industrial Fuel Fabrication and Development; Contract 59613 with ORNL, which includes AGR-2 compact fabrication and characterization
Supplier Name/Address: Supplier of 93071A and 93072A particles is Babcock & Wilcox Co., 1570 Mt. Athos Road, Lynchburg, VA 24504	*This NCR is for: ☐ ICP ☒ INL ☐ Other

*Is the non-conformance under the requirement of SNF or NRC-licensed activities (DOE/RW-0333P)? ○ Yes ● No

*Specification to which Item does not perform:

SPC-923, Rev 2, AGR-2 Fuel Specification (in effect when particle data packages submitted by B&W) and SPC-923, Rev 3 (in effect when LEU07 and 93071A particles were analyzed for IPyC defects by ORNL)

Associated Documents:
Data packages for LEU07 compacts (not issed at this time); B&W Data Packages for AGR-2 UCO particles, lots G73J-14-93071A and G73J-14-93072A (2 separate data packages)

*Non-Conformance Description:

ORNL determined that more than 400 particles out of approximately 64,000 particles from LEU07 compacts showed evidence of uranium dispersion, indicating defective IPyC layers on these particles. The analysis has not been finalized but ORNL estimates that the defect fraction will be in the range 5-7x 10-3 (from July NGNP monthly report), compared to the specification value of ≤1x10-4. Analysis of samples of 10,000 particles from batches 93071A and 93072A showed uranium dispersion in both of these batches both before and after heat treatment at 1800 C for 1 hour (to simulate heat treatment of compacts). Analysis of these particles suggests that the uranium dispersion in 93071A particles is likely due to cracked IPyC layers that may have been caused by an anomalous event during coating in which the cup used to withdraw a sample of IPyC-coated particles broke off from the rod holding it, fell into the particle bed and remained in the particle bed during SiC and OPyC coating. Analysis of 93072A particles has not identified a likely cause as of this date, but efforts are continuing to identify the cause. The results of these analyses will be used to define coating tests at B&W to resolve the cause and demonstrate the consistent production of particles with acceptably low levels of IPyC defects.

*Responsible Manager (RM):	*Responsible Quality Engineer (QE):
Cox, John R Alternate RM for processing NCR: Cox, John R	Roberts, Gary D

Next Activity: Implementation Completion - RM
Actionee: Cox, John R
Date Due:

Screening - Responsible Manager

Responsible Manager (RM):	Organization	Phone:	Date Screened:
Cox, John R	C700	6-5585	08/05/2009

*Initiator has selected "No" to the non-conformance under the requirement of SNF or NRC-licensed activities (DOE/RW-0333P). Is this Correct?
● Yes ○ No

*Does the NCR require Stop Work?
○ Yes ● No

*Does this NCR support Environmental Requirements? ○ Yes ● No

RM Comments:
None

Screening - Quality Engineer

Quality Engineer (QE):	Organization	Phone:	Date Screened:
Roberts, Gary D	W560	6-8961	08/05/2009

*Is the NCR valid? ● Yes ○ No

Quality Comments:
None

Notification - RM

Responsible Manager (RM):	Organization	Phone:	Date Notified:
Cox, John R	C700	6-5585	08/05/2009

ORPS Report Number:	*Is the NCR operational equipment needed for Conditional Use?
N/A	○ Yes ● No
*Area of Responsibility: INL NGNP	Optional Internal Area of Responsibility:
Cognizant Director: Soto, Rafael Cognizant Director's Alternate(s): Smith, Angela J; Armour, Kimberly Jo	*Facility Manager: Pettl, David A
Compliance Coordinator(s) to determine Price Anderson (PAAA) noncompliance: Smith, Angela J	*Does the non-conformance involve suspect/counterfeit items? ○ Yes ● No

*Does this NCR pertain to Waste Containers, Waste Packaging, or Packaging and Transportation activities? ○ Yes ● No

Method of Segregation:
Material is located at ORNL and is segregated from other fuel batches to prevent inadvertent use

Method of Identification:
clearly lable by batch number

*Lead Disposition Evaluator: Barnes, Charles M Additional Disposition Evaluator(s): (These evaluators verify and concur the disposition of NCR.)	This block is intentionally left blank.

Additional Notification:

QE Red Tag Process

Quality Engineer (QE):	Organization	Phone:	Date Processed:
Roberts, Gary D	W560	6-8961	08/04/2009

Tagging Information/Other Methods:
Item is not tagged with Red Tag. Segregation and batch number used to identify non-conforming material at ORNL.

Other means of Tag Identification:
N/A

Disposition

Lead Disposition Evaluator:	Organization:	Phone:	Date Disposition sent for approval:
Barnes, Charles M	C700	6-0864	08/13/2009

*NCR Disposition:
○ Use As Is ○ Reject
○ Repair ● Multiple Disposition
○ Rework

*Multiple Disposition Documentation:
1. 93071A particles: Do not use for AGR-2 fuel because of anomalous event during coating and high IPyC layer defect fraction. Keep retainer and archive samples of 93071A particles at ORNL and B&W but dispose of remainder as needed by ORNL to keep enriched uranium inventory within facility limits. Disposal can be through normal ORNL waste disposal channels, or by returning to B&W. B&W would store this material and evaluate whether to recover the enriched uranium in this material along with other scrap materials from

	the AGR program when sufficient inventory builds up or at program close out. 2. 93072A particles: Very limited quantities of these particles remain and should be archived and stored at ORNL with other archived AGR material. The purpose of retaining these particles is for possible future analyses to better determine the cause of the defects and to use for purposes unrelated to the particle defects. 3. LEU07 compacts: Due to the high fraction of IPyC defects in the particles contained in these compacts, the compacts should be rejected from use in the AGR-2 experiment. However, due to the full characterization that has been performed on these compacts and the kernels and particles they contain, LEU07 compacts should be retained in storage at INL and ORNL for possible future uses. These possible uses include measurements of thermal conductivity or other compact properties, tests of PIE methods, and irradiation experimetns to determine the consequences of high uranium dispersion and establish a better basis for the defective IPyC fuel specification.
*Does Disposition represent Design Change? ○ Yes ● No	*Does this item require a Unreviewed Safety Question (USQ) screening and evaluation? ○ Yes ● No

Identify as-built drawings and other documentation:(*For Use-As-Is and Repair)
N/A

Method of Disposal:(*For Reject)
Disposal will be in accordance with waste disposal processes at ORNL and/or B&W.

Technical Justification:(*For Use-As-Is and Repair)
N/A

Technical requirements and acceptance criteria to be used for repair work:
N/A

Inspections and Verification Criteria for acceptability of repair or rework:
N/A

Other Documents or QA records requiring the change:
N/A

If this nonconforming item is associated with, or caused by, a program, procedure, or process problem, document the issue in accordance with LWP-13840:

N/A

Disposition Concurrence/Approval

Approval RM(Signature)	Concurrence/Approval QE(Signature)	This block is intentionally left blank.	This block is intentionally left blank.
Cox, John R *John R Cox* 08/13/2009	Roberts, Gary D *Gary D Roberts* 08/13/2009		

Implementation Completion - RM

Responsible Manager (RM):	Organization	Phone:	Date Completion:
Cox, John R	C700	6-5585	

The Disposition as approved has been completed and implemented: ○ Yes ○ N/A

Implementing Documentation:

Attachments/Comments

PAAA 44792 (AGR-2 particles).pdf

Revision History

08/13/2009 04:14 PM : Gary D Roberts as a QE concurred the Disposition and signed off.
08/13/2009 02:12 PM : John R Cox as an RM concurred the Disposition and signed off.

08/13/2009 01:57 PM : Charles M Barnes completed NCR Disposition and submitted to Cox, John R; Roberts, Gary D for their concurrence and approval.
08/05/2009 12:23 PM : John R Cox completed Notification Process and notified Roberts, Gary D; Soto, Rafael; Smith, Angela J; Smith, Angela J; Petti, David A; Barnes, Charles M
08/05/2009 12:15 PM : Gary D Roberts completed screening and forwarded to Cox, John R for Notification process.
08/05/2009 12:03 PM : John R Cox completed screening and forwarded to Roberts, Gary D for QE Screening.
08/04/2009 04:15 PM : Charles M Barnes submitted NCR to RM Cox, John R for screening.

The following fields are general purpose public use. Any data entered here is not related to NCR process and solely used for one's individual need. Integrity of the data is not guarantied since it can be replaced by any user randomly.

FIELD A:
(Field Name: FIELDA, type Text)

FIELD B:
(Field Name: FIELDb, type Text)