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Data Compilation for AGR-2 UCO Variant Compact Lot LEU06-OP1-Z

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Data Compilation for AGR-2 UCO Variant Compact Lot LEU06-OP1-Z

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This document is a compilation of characterization data for the candidate AGR-2 UCO Variant fuel compact lot LEU06-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 LEU06. LEU06 came from Babcock and Wilcox (B&W) coated particle lot G73J-14-93074A, 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-14-93074A can be found in ORNL/TM-2008/135.

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 Non-Conformance Reports are attached as Appendices.

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1 Material identification record for LEU06-OP1-Z compacts

Table 1-1 lists the materials used to make the LEU06-OP1-Z compacts, including intermediate batches and samples used for characterization. TRISO-coated particles were shipped from B&W to ORNL on September 22, 2008. Twenty four completed compacts were shipped to INL on June 24, 2009. Sixty four compacts were retained at ORNL and forty seven 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 LEU06-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-14-93074A	G73I-14-69307	B&W TRISO-coated particles
NP-B8092	G73J-14-93074A	1000 g sample from 93074A shipped to ORNL on 9/22/2008
LEU06	NP-B8092	TRISO-coated particles after methanol wash
LEU06-A01	LEU06	TRISO-coated particle QC archive
LEU06-B01 LEU06-C01 LEU06-D01 LEU06-E01 LEU06-F01 LEU06-G01	LEU06	TRISO-coated particle characterization samples
LEU06-Y##	LEU06	Charges for overcoating, numbered Y01 through Y49
RD13371	Asbury Graphite Mills	Natural graphite
KRB2000	SGL Carbon	Synthetic graphite
SC1008	Hexion	Durite resin lot LK8HD0397
RDKrS-112608 RDKrS-120308 RDKrS-121108 RDKrS-121808 RDKrS-122208	64 wt% RD13371 16 wt% KRB2000 20 wt% SC1008	Matrix precursor batches
LEU06-OP1	LEU06-Y03 to LEU06-Y07 + RDKrS-112608 LEU06-Y08 to LEU06-Y17 + RDKrS-120308 LEU06-Y18 to LEU06-Y31 + RDKrS-121108 LEU06-Y32 to LEU06-Y41 + RDKrS-121808 LEU06-Y42 to LEU06-Y48 + RDKrS-122208	Over-coated particle composite
LEU06-OP1-A01	LEU06-OP1	Overcoated particle QC archive
LEU06-OP1-B01 LEU06-OP1-C01	LEU06-OP1	Overcoated particle characterization samples
LEU06-OP1-G###	LEU06-OP1	Compacts, numbered G001 through G180
LEU06-OP1-Z###	LEU06-OP1-G###	Compacts, numbered Z001 through Z135 One to one correspondence to G### recorded on DRF24C (section 7)

Table 1-2: Disposition of LEU06-OP1-Z compacts

Sent to INL	Retained at ORNL		Consumed during QC analysis	
LEU06-OP1-Z072	LEU06-OP1-Z002	LEU06-OP1-Z052	LEU06-OP1-Z001	LEU06-OP1-Z063
LEU06-OP1-Z080	LEU06-OP1-Z004	LEU06-OP1-Z053	LEU06-OP1-Z003	LEU06-OP1-Z064
LEU06-OP1-Z081	LEU06-OP1-Z006	LEU06-OP1-Z054	LEU06-OP1-Z005	LEU06-OP1-Z069
LEU06-OP1-Z082	LEU06-OP1-Z008	LEU06-OP1-Z056	LEU06-OP1-Z007	LEU06-OP1-Z070
LEU06-OP1-Z084	LEU06-OP1-Z009	LEU06-OP1-Z060	LEU06-OP1-Z013	LEU06-OP1-Z073
LEU06-OP1-Z085	LEU06-OP1-Z010	LEU06-OP1-Z061	LEU06-OP1-Z014	LEU06-OP1-Z074
LEU06-OP1-Z086	LEU06-OP1-Z011	LEU06-OP1-Z065	LEU06-OP1-Z015	LEU06-OP1-Z078
LEU06-OP1-Z090	LEU06-OP1-Z012	LEU06-OP1-Z066	LEU06-OP1-Z016	LEU06-OP1-Z083
LEU06-OP1-Z091	LEU06-OP1-Z017	LEU06-OP1-Z067	LEU06-OP1-Z018	LEU06-OP1-Z089
LEU06-OP1-Z097	LEU06-OP1-Z019	LEU06-OP1-Z068	LEU06-OP1-Z023	LEU06-OP1-Z094
LEU06-OP1-Z102	LEU06-OP1-Z020	LEU06-OP1-Z071	LEU06-OP1-Z024	LEU06-OP1-Z098
LEU06-OP1-Z104	LEU06-OP1-Z021	LEU06-OP1-Z075	LEU06-OP1-Z027	LEU06-OP1-Z099
LEU06-OP1-Z105	LEU06-OP1-Z022	LEU06-OP1-Z076	LEU06-OP1-Z031	LEU06-OP1-Z107
LEU06-OP1-Z106	LEU06-OP1-Z025	LEU06-OP1-Z077	LEU06-OP1-Z032	LEU06-OP1-Z108
LEU06-OP1-Z109	LEU06-OP1-Z026	LEU06-OP1-Z079	LEU06-OP1-Z035	LEU06-OP1-Z110
LEU06-OP1-Z112	LEU06-OP1-Z028	LEU06-OP1-Z087	LEU06-OP1-Z037	LEU06-OP1-Z111
LEU06-OP1-Z113	LEU06-OP1-Z029	LEU06-OP1-Z088	LEU06-OP1-Z040	LEU06-OP1-Z115
LEU06-OP1-Z114	LEU06-OP1-Z030	LEU06-OP1-Z092	LEU06-OP1-Z047	LEU06-OP1-Z120
LEU06-OP1-Z118	LEU06-OP1-Z033	LEU06-OP1-Z093	LEU06-OP1-Z051	LEU06-OP1-Z122
LEU06-OP1-Z119	LEU06-OP1-Z034	LEU06-OP1-Z095	LEU06-OP1-Z054	LEU06-OP1-Z126
LEU06-OP1-Z123	LEU06-OP1-Z036	LEU06-OP1-Z096	LEU06-OP1-Z057	LEU06-OP1-Z129
LEU06-OP1-Z127	LEU06-OP1-Z038	LEU06-OP1-Z100	LEU06-OP1-Z058	LEU06-OP1-Z131
LEU06-OP1-Z128	LEU06-OP1-Z039	LEU06-OP1-Z101	LEU06-OP1-Z059	LEU06-OP1-Z135
LEU06-OP1-Z132	LEU06-OP1-Z041	LEU06-OP1-Z103	LEU06-OP1-Z062	
	LEU06-OP1-Z042	LEU06-OP1-Z116		
	LEU06-OP1-Z043	LEU06-OP1-Z117		
	LEU06-OP1-Z044	LEU06-OP1-Z121		
	LEU06-OP1-Z045	LEU06-OP1-Z124		
	LEU06-OP1-Z046	LEU06-OP1-Z125		
	LEU06-OP1-Z048	LEU06-OP1-Z130		
	LEU06-OP1-Z049	LEU06-OP1-Z133		
	LEU06-OP1-Z050	LEU06-OP1-Z134		

2 Summary of acceptance test results for LEU06-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, LEU06-OP1-Z, did not meet all the requirements in section 3.3 of SPC-923, Rev. 3. Nonconformances related to compact length and calcium impurity content were 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. 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.

Table 2-1 is provided for quick reference. It gives the mean values of key variable properties of the compact lot, LEU06-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 LEU06-OP1-Z.

Property	Mean
Mean uranium loading (g U/compact)	1.256
Compact diameter (mm)	12.29
Compact length (mm)	25.18
Compact mass (g)	6.254
Compact matrix density (g/cm^3)	1.56
Impurity content	Table 2-2

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. Two sets of values are reported. The second set of values was after re-analysis of some of the compacts due to an erroneously high calcium value in the first analysis (see section 7)

Table 2-2: Mean impurity levels for fuel compacts from LEU06-OP1-Z compact lot measured by deconsolidation leach-burn-leach technique.

Impurity	Measured impurity content (μg/compact)	
	Initial analysis	Re-analysis
Iron	1.43 - 4.82	1.43 - 4.86
Chromium	0.34 - 0.77	0.30 - 0.64
Manganese	0.31 - 1.08	0.31 - 0.84
Cobalt	0.00 - 0.33	0.00 - 0.26
Nickel	0.00 - 1.63	0.00 - 1.28
Calcium	74.98 - 77.90	39.23 - 40.78
Aluminum	32.75 - 33.19	31.37 - 31.48
Titanium	7.73 - 9.44	7.77 - 9.12
Vanadium	20.36 - 20.76	20.06 - 20.37

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 LEU06-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 LEU06-OP1-Z.

Property	Observed Number of Defects/ Number of Particles Analyzed	95% Confidence Defect Fraction
Uranium contamination fraction	10/127448	≤1.4E-4
Defective SiC coating fraction	0/127448	≤2.4E-5
Defective IPyC coating fraction	0/63724	≤4.8E-5
Defective OPyC coating fraction	0/3186	≤9.4E-4

It is also interesting to note the increase in pyrocarbon anisotropy due to compact heat treatment. The diattenuation of the IPyC increased from 0.0113±0.0002 to 0.0145±0.0008 (1.0338±0.0007 to 1.0436±0.0024 in terms of effective BAFo). The diattenuation of the OPyC increased from 0.0083±0.0005 to 0.0136±0.0003 (1.0248±0.0015 to 1.0407±0.0009 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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Compact ID numbers of compacts not consumed by acceptance testing:	002 004 006 008 009 010 011 012 017 019 020 021 022 025 026 028 029 030 033 034 036 038 039 041 042 043 044 045 046 048 049 050 052 053 055 056 060 061 065 066 067 068 071 072 075 076 077 079 080 081 082 084 085 086 087 088 090 091 092 093 095 096 097 100 101 102 103 104 105 106 109 112 113 114 116 117 118 119 121 123 124 125 127 128 130 132 133 134

Property	Measured Data				Specification	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
	Mean (x)	Std. Dev. (s)	Measurements (n)	k or t value	INL SPC-923 Revison 3				
Uranium loading (gU/compact)	1.256	0.002	6	2.015	1.265 ± 0.07	A = x - ts/√n ≥ 1.195	1.254	pass	DRF-25
						B = x + ts/√n ≤ 1.335	1.258	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)	4.82	2.26	8	1.895	mean ≤ 25	B = x + ts/√n ≤ 25	6.3	pass	IRF-12B DRF-26
				4.353	dispersion ≤0.01 ≥ 100	D = x + √3ks < 100	21.9	pass	
Chromium content outside SiC (µg/compact)	0.77	0.15	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	0.9	pass	IRF-12B DRF-26
Manganese content outside SiC (µg/compact)	1.08	0.83	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	1.6	pass	IRF-12B DRF-26
Cobalt content outside SiC (µg/compact)	0.33	0.01	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	0.3	pass	IRF-12B DRF-26
Nickel content outside SiC (µg/compact)	1.63	0.07	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	1.7	pass	IRF-12B DRF-26
Cr + Mn + Co + Ni content outside SiC (µg/compact)	3.80	0.83	8	4.353	dispersion ≤0.01 ≥ 200	D = x + √3ks < 200	10.1	pass	IRF-12B DRF-26
Calcium content outside SiC (µg/compact)	77.90	46.45	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	109.0	fail	IRF-12B DRF-26
Aluminum content outside SiC (µg/compact)	33.19	7.29	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	38.1	pass	IRF-12B DRF-26
Ti + V content outside SiC (µg/compact)	30.20	1.53	8	1.895	mean ≤ 240	B = x + ts/√n ≤ 240	31.2	pass	IRF-12B DRF-26

Property	Measured Data		Specification	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
	# of compacts	# of particles	INL SPC-923 Revison 2				
Uranium contamination fraction (g exposed U/gram U in compact)	40	127448	≤ 2.0×10^{-5}	≤1 effectively exposed kernel in ≥237192 particles or ≤2 effectively exposed kernels in ≥314788 particles	9.9	fail	IRF-12C DRF-26
Defective SiC coating fraction (fraction of total particles)	40	127448	≤ 1.0×10^{-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	63724	≤ 1.0×10^{-4}	≤1 with excessive U dispersion in ≥47437 particles or ≤2 with excessive U dispersion in ≥62956 particles	0	pass	DRF-28
Defective OPyC coating fraction (fraction of total particles)	1	3186	≤ 0.01	≤6 cracked or missing OPyC in ≥1182 particles	0	pass	DRF-27

Comments

Four compacts were outside of the length specification by -0.017 mm, -0.005 mm, -0.132 mm, and +0.036 mm. This non-conformance was documented on ORNL NCR-X-MSTD-AGR-10-01 with a disposition of use as is.
The measured Ca impurity was above the specified limit. The reported high calcium level is thought to be a result of measurement uncertainty, rather than an actual high calcium content in the compacts. This non-conformance was documented on ORNL NCR-X-MSTD-AGR-10-02 with a disposition of use as is.
A 10/127448 uranium contamination fraction is above the specified limit and corresponds to <1.4e-4 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.
LBL analysis was halted after 40 compacts were analyzed due to the high defect fraction. The remaining compacts slated for LBL were added to list of compacts not consumed by QC testing.

QC Supervisor — Date: 12-17-09

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

QA Reviewer — Date: 12/17/09

3 Compacting process conditions

A 1000 g sample was riffled from coated particle batch G73J-14-93074A using a chute splitter, and shipped from B&W on September 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 renamed LEU06 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-nine overcoater charges were prepared and labeled LEU06-Y01 through Y49. The results of the PIP-10 inspection are reported in section 5. Additional ORNL characterization performed on another sample taken from G73J-14-93074A is provided in ORNL/TM-2008/135, "Data Compilation for AGR-2 UCO Variant Coated Particle Batch G73J-14-93074A".

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 LEU06-Y## riffled aliquots were overcoated with the following matrix batches: Y01-Y07 (RDKrS 112608), Y08-Y17 (RDKrS 120308), Y18-Y31 (RDKrS 121108), Y32-Y41 (RDKrS 121808), and Y42-Y48 (RDKrS 122208). Aliquot LEU06-Y49 was not overcoated because a sufficient quantity of overcoated particles was accumulated from Y03-Y48. Aliquots Y01 and Y02 were overcoated during a joint ORNL/INL QA surveillance exercise and used to make test compacts. The overcoated particles created from overcoating LEU06-Y01 and LEU06-Y02 were not included in the composite overcoated particle batch that was used to make the LEU06-OP1-Z compacts.

In total, 1340 grams of -12/+16 overcoated particles were produced by overcoating TRISO aliquots Y03-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 1340 grams of sieved overcoated particles was tabled and 1196 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. 1196 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 135.

After overcoating, the overcoated particles from Y03-Y48 were combined and homogenized into an overcoated particle composite. The overcoated particle composite was labeled LEU06-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 6. The plan also calls for riffling of compact charges for pressing.

Based on the average uranium loading determined for the LEU06 particles of 3.953E-4 g (section 5), 3200 particles are 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). The average LEU06-OP1 overcoated particle weight was measured to be 1.977E-3 g (section 6). Using this value, a compact charge of 6.327 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 LEU06-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 1.256 ± 0.002 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 3186, 14 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.

The 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 94.5°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, LEU06-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."

After compacting, 135 compacts were selected from LEU06-OP1-G001 through G180 for use. Compacts with obvious processing defects, chips, or undesirable dimensions were sorted out and not included in the 135 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 135 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 135 compacts were randomized and relabeled as LEU06-OP1-Z001 through Z135. 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.

A significant number of LEU06-OP1-G### compacts had what appeared to be a thin surface crack where the end caps met the overcoated particles. This feature was used as one criterion for not selecting compacts for inclusion in the LEU06-OP1-Z compact lot. 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 and future compacts were fabricated at 70°C in order to eliminate the problem.

AGR-2 Process Conditions

The LEU06-OP1-Z (AGR-2 UCO Variant) 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 3-1 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 3-1: Summary of process conditions used in making LEU06-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
LEU06-OP1-Z001	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z002	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z003	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z004	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z005	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z006	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z007	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z008	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z009	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z010	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z011	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z012	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z013	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z014	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z015	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z016	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z017	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z018	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z019	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z020	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z021	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z022	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z023	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z024	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z025	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z026	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z027	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z028	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z029	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z030	15.0	4.7	950	1	flowing He	20	1800	1	vacuum

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QAS Review [signature] Date 12/23/09

Table 3-1 (cont.): Summary of process conditions used in making LEU06-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
LEU06-OP1-Z031	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z032	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z033	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z034	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z035	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z036	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z037	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z038	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z039	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z040	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z041	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z042	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z043	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z044	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z045	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z046	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z047	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z048	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z049	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z050	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z051	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z052	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z053	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z054	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z055	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z056	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z057	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z058	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z059	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z060	16.5	4.7	950	1	flowing He	20	1800	1	vacuum

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Table 3-1 (cont.): Summary of process conditions used in making LEU06-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
LEU06-OP1-Z061	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z062	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z063	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z064	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z065	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z066	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z067	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z068	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z069	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z070	16.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z071	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z072	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z073	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z074	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z075	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z076	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z077	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z078	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z079	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z080	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z081	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z082	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z083	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z084	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z085	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z086	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z087	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z088	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z089	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z090	16.5	4.7	950	1	flowing He	20	1800	1	vacuum

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Table 3-1 (cont.): Summary of process conditions used in making LEU06-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
LEU06-OP1-Z091	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z092	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z093	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z094	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z095	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z096	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z097	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z098	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z099	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z100	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z101	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z102	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z103	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z104	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z105	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z106	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z107	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z108	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z109	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z110	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z111	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z112	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z113	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z114	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z115	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z116	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z117	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z118	15.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z119	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z120	16.5	4.7	950	1	flowing He	20	1800	1	vacuum

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Table 3-1 (cont.): Summary of process conditions used in making LEU06-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
LEU06-OP1-Z121	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z122	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z123	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z124	16.9	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z125	15.0	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z126	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z127	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z128	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z129	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z130	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z131	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z132	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z133	16.5	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z134	14.2	4.7	950	1	flowing He	20	1800	1	vacuum
LEU06-OP1-Z135	16.5	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, synthetic graphite, and matrix that were used to make LEU06-OP1-Z compacts. Natural graphite (Asbury Graphite Mills RD13371), synthetic graphite (SGL Carbon KRB2000), and thermosetting resin (Hexion Durite SC1008-lot LK8HD0397) were combined in a weight ratio of 64:16:20 to make the matrix. Five batches of matrix were produced: RDKrS-112608, RDKrS-120308, RDKrS-121108, RDKrS-121808, and RDKrS-122008. A sample of the RDKrS-120308 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 LEU06-OP1-Z compacts

Element	Impurity concentration (ppm)		
	Natural Graphite-RD13371	Synthetic Graphite-KRB2000	Heat treated Matrix-RDKrS-120308
Al	36	0.35	0.25
Ca	9.4	0.7	<0.05
Ti	0.43	0.06	0.78
V	0.6	0.02	2
Cr	4.5	<0.5	<0.5
Mn	0.54	<0.05	<0.05
Fe	34	1.4	0.18
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. LEU06-OP1-Z compacting was completed on 2/09/09.

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GDMS
ANALYTICAL REPORT

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ORNL/TM-2009/304

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

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GDMS
ANALYTICAL REPORT

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ORNL/TM-2009/304

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

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

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		

Reviewed by David Shum

EAG Evans Analytical Group

GDMS
ANALYTICAL REPORT

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

Telephone (315) 431-9900
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Email info.ny@eaglabs.com
www.eaglabs.com

Customer: **UT-Battelle Oak Ridge** *P.O.#* cc
Date: 18-Dec-08 *Job #* S08Q9432

Customer ID: **Graphite 120308** *Shiva ID:* S081215043

Element	Concentration [ppm wt]	Element	Concentration [ppm wt]
Li	-	Pd	-
Be	-	Ag	< 0.1
B	-	Cd	-
C	Matrix	In	Binder
N	-	Sn	-
O	-	Sb	-
F	-	Te	-
Na	0.06	I	-
Mg	-	Cs	< 0.1
Al	0.25	Ba	-
Si	7.3	La	-
P	-	Ce	< 0.5
S	3.9	Pr	-
Cl	-	Nd	-
K	-	Sm	-
Ca	< 0.05	Eu	-
Sc	-	Gd	-
Ti	0.78	Tb	-
V	2	Dy	-
Cr	< 0.5	Ho	-
Mn	< 0.05	Er	-
Fe	0.18	Tm	-
Co	< 0.05	Yb	-
Ni	< 0.1	Lu	-
Cu	< 0.1	Hf	-
Zn	< 0.1	Ta	-
Ga	-	W	-
Ge	-	Re	-
As	-	Os	-
Se	-	Ir	-
Br	-	Pt	-
Rb	-	Au	-
Sr	-	Hg	-
Y	-	Tl	-
Zr	-	Pb	-
Nb	-	Bi	-
Mo	-	Th	-
Ru	-	U	-
Rh	-		

Brad Mills

Accreditations: ISO/IEC 17025, Nadcap

Reviewed by _____

HEXION Hexion Specialty Chemicals, Inc.

Certificate of Analysis

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

Ship Date: 09/02/2008
DDN: 82390471
Customer - PO#: 901629
Date of MFG: 08/25/2008

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: LK8HD0397					
pH, 25C	8.13		7.90	8.50	IR-034
Specific Gravity	1.0810		1.0700	1.1000	IR-026
Viscosity	218	cPs	180	300	IR-111
In-process Tests	Passes	-	-	-	
Solids, Phenolic (ISO)	61.21	%	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.

Benita A Young
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 LEU06. 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-14-93074A particles were renamed LEU06 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-nine overcoater charges were prepared and labeled LEU06-Y01 through Y49. Additional ORNL characterization performed on another sample taken from G73J-14-93074A is provided in ORNL/TM-2008/135, "Data Compilation for AGR-2 UCO Variant Coated Particle Batch G73J-14-93074A".

The following pages show the inspection report form (IRF-10) for the LEU06 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:	LEU06
Coated particle composite description:	AGR-2 UCO Variant, from G73J-14-93074A

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)	874.7	22	2002	1.646	Not Applicable				DRF-07 DRF-10
Average particle weight (g)	1.036E-03				Not Applicable				DRF-22
Average particle envelope volume (cm^3)	3.46E-04				Not Applicable				DRF-31
OPyC open porosity (ml/m^2)	0.215				Not Applicable				DRF-31
Average uranium per particle (g)	3.953E-04				Not Applicable				DRF-35

Comments

John Hunn
QC Supervisor

10-19-2009
Date

M. C. [signature]
QA Reviewer

12/17/09
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:	LEU06-B01
Sample Description:	AGR-2 UCO Variant 1, G73J-14-93074A
Folder name containing images:	\\Mc-agr\AGR\ImageProcessing\P08111001\

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

November 11, 2008
Date

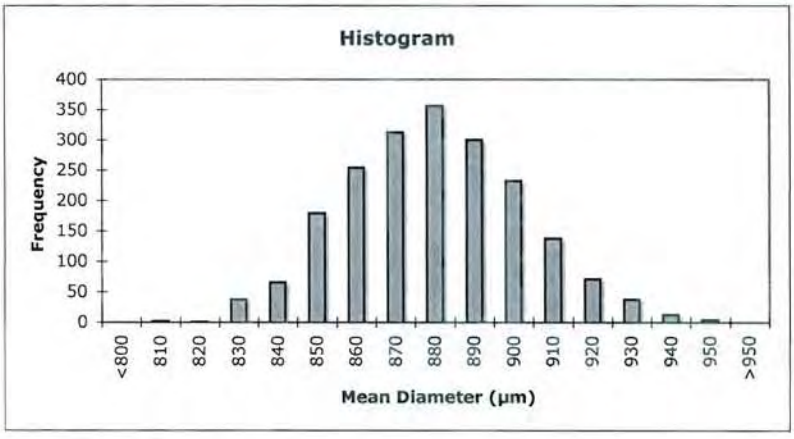
Data Report Form DRF-10A: Measurement of Particle Diameter

Procedure:	AGR-CHAR-DAM-10 Rev. 2
Operator:	Andrew K. Kercher
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P08111001\
Sample ID:	LEU06-B01
Sample Description:	AGR-2 UCO Variant 1, G73J-14-93074A
Folder name containing processed data:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P08111001_output\

Number of particles analyzed:	2002
Mean of the average diameter of each particle (μm):	874.7
Standard deviation in the average diameter of each particle (μm):	22

Distribution of the average particle diameter (top binned)

Mean Diameter (μm)	*Frequency*
<800	0
810	2
820	1
830	37
840	66
850	179
860	254
870	313
880	356
890	300
900	232
910	137
920	71
930	37
940	13
950	4
>950	0



Andrew K. Kercher
Operator

November 12, 2008
Date

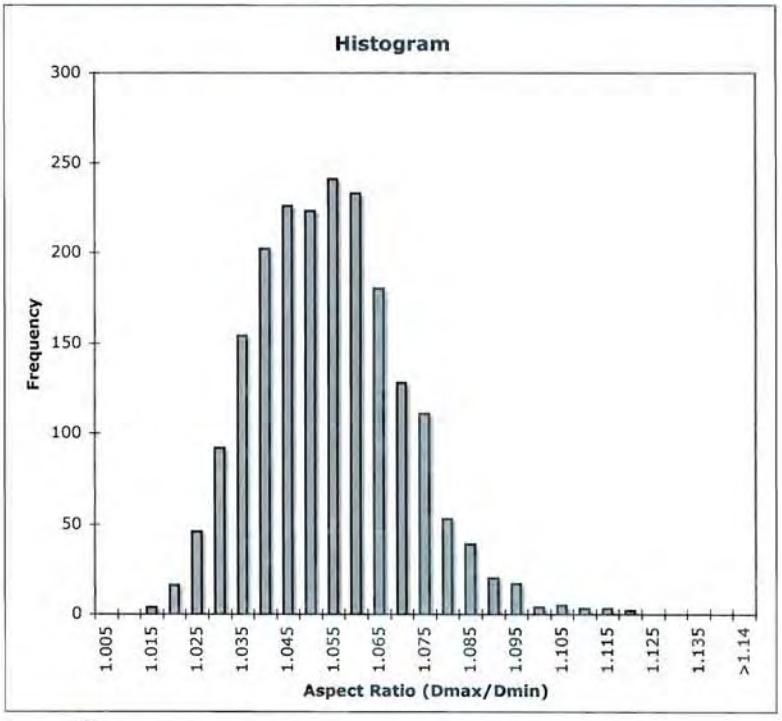
Data Report Form DRF-10B: Measurement of Particle Aspect Ratio (Dmax/Dmin)

Procedure:	AGR-CHAR-DAM-10 Rev. 2
Operator:	Andrew K. Kercher
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P08111001\
Sample ID:	LEU06-B01
Sample Description:	AGR-2 UCO Variant 1, G73J-14-93074A
Folder name containing processed data:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P08111001_output\

Number of particles analyzed:	2002
Number of particles with aspect ratio ≥ 1.14	0
Average particle aspect ratio:	1.051

Distribution of the aspect ratio (top binned)

Aspect Ratio (D)	*Frequency*
1.005	0
1.010	0
1.015	4
1.020	16
1.025	46
1.030	92
1.035	154
1.040	202
1.045	226
1.050	223
1.055	241
1.060	233
1.065	180
1.070	128
1.075	111
1.080	53
1.085	39
1.090	20
1.095	17
1.100	4
1.105	5
1.110	3
1.115	3
1.120	2
1.125	0
1.130	0
1.135	0
1.140	0
>1.14	0



Operator

November 12, 2008

Date

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

Procedure:	AGR-CHAR-DAM-22 Rev. 1
Operator:	Dixie Barker
Particle Lot ID:	LEU06-C01
Particle Lot Description:	AGR-2 UCO Variant 1, G73J-14-93074A
Filename:	\\mc-agr\AGR\ParticleWeight\W08102001_DRF22R1.xls

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Weight of particles (g):	0.1808	0.2720	0.3211	0.2699	0.2992
Number of particles:	175	262	310	260	289
Average weight/particle (g):	1.033E-03	1.038E-03	1.036E-03	1.038E-03	1.035E-03

Mean average weight/particle (g):	1.036E-03
Standard error in mean average weight/particle (g):	9.40E-07

Dixie Barker
Operator

10-20-08
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:	LEU06-B01
Batch Description:	AGR-2 UCO Variant, G73J-14-93074A
Thermocouple Expiration Date:	5/15/09
Penetrometer Expiration Date:	7/10/09
Completed DRF Filename:	\\mc-agr\AGR\Porosimeter\S08120401\S08120401_DRF31R1.xls

Mean average weight/particle (g):	1.04E-03
Standard error in mean average weight/particle (g):	9.40E-07

Weight of particles (g):	3.8494
Approximate number of particles:	3716
Uncertainty in number of particles:	3
Total envelope volume of sample (cc):	1.284
Average envelope volume/particle (cc):	3.46E-04
Sample envelope density (g/cc):	2.998

Average particle diameter (microns):	8.71E+02
Average surface area/particle (cm2):	2.38E-02
Total sample surface area (cm2):	8.85E+01
Intruded mercury volume from 250-10,000 psia (cc):	1.90E-03
Open porosity (ml/m2):	2.15E-01

Comments
Sample LEU06-B01 was used after particle size and shape analysis was complete because LEU06-D01 was not available.

S. D. Nunn
Operator

12/4/08
Date

Data Report Form DRF-35: Fuel Particle Uranium Loading

Procedure:	AGR-CHAR-DAM-35 Rev. 0
Operator:	Fred Montgomery
Particle lot ID:	LEU-06
Particle lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\UraniumLoading\LEU06_DRF35R0.xls

Mean average weight per particle (g):	1.036E-03
Standard error in mean average weight per particle (g):	9.4E-07

	Sample 1		Sample 2		Sample 3	
	Leach 1	Leach 2	Leach 1	Leach 2	Leach 1	Leach 2
Particle sample ID:	LEU06-E01		LEU06-F01		LEU06-G01	
Weight of particles:	4.0109		3.9200		3.8813	
Approximate number of particles:	3872		3784		3746	
Uncertainty in number of particles:	4		3		3	
Acid leach sample ID:	U08122301	U08122901	U08122302	U08122902	U08122303	U08122903
Radiochemical laboratory analysis number:	1585-001	1585-004	1585-002	1585-005	1585-003	1585-006
Weight U in leach (mg):	1534	0.059	1488	0.041	1485	0.027
Uncertainty in weight U in leach (mg):	6	0.00591	6	0.00406	6	0.00267
Total weight U in sample (mg):	1534		1488		1485	
Average weight U per particle (mg):	0.3963		0.3932		0.3963	
Uncertainty in average weight U per particle (mg):	0.0016		0.0016		0.0016	

Mean average uranium loading per particle (g):	3.953E-04
Standard error in mean average uranium loading per particle (g):	1.0E-06

Comments
Leach 1 was analyzed by Davies-Gray titration method. Leach 2 was analyzed by ICP-MS, due to low U concentration. Leach 1 was titrated 2 times and averaged. Davies-Gray Initial known U recovery: 100.30%; final known U recovery 100.50% Blind titration U recovery 100.13%. Uncertainty in Davies-Gray (0.4%) based on average of measured % recovery data for LEU06,07,08,09. Checked against RMAL1585 official results by FCM on 3/06/2009.

Fred C. Montgomery
Operator

10-19-2009
Date

6 Characterization of overcoated particles

This section contains characterization data on the overcoated particle lot LEU06-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 LEU06-Y03 through Y48 were combined and homogenized into an overcoated particle composite. The overcoated particle composite was labeled LEU06-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 LEU06-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 LEU06-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, (1304 μm - 875 μm)/2 = 214.5 μm. The increase in average particle weight was (1.977 mg - 1.036 mg) = 0.941 mg. From these values, the average density of the overcoating prior to compacting can be estimated to be 1.16 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:	LEU06-OP1
Overcoated particle composite description:	AGR-2 UCO Variant, from G73J-14-93074A

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)	1304.0	86	930	1.646	Not Applicable				DRF-29 DRF-30
Average overcoated particle weight (g)	1.977E-03				Not Applicable				DRF-22

Comments

Overcoated particle weight from combined results of 2 independent measurements (W09011401 and W09011402).

QC Supervisor: [signature] Date: 12-17-09

QA Reviewer: [signature] Date: 12/17/09

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:	LEU06-OP1-B01
Sample Description:	AGR-2 UCO Variant, from G73J-14-93074A
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\P09021701\

DMR Calibration Expiration Date:	10/28/09
Stage Micrometer Calibration Expiration Date:	2/10/14
Measured Value for 2500 μm in Stage Micrometer Image:	2501.8 μm

A. K. Kercher — Operator

February 17, 2009 — Date

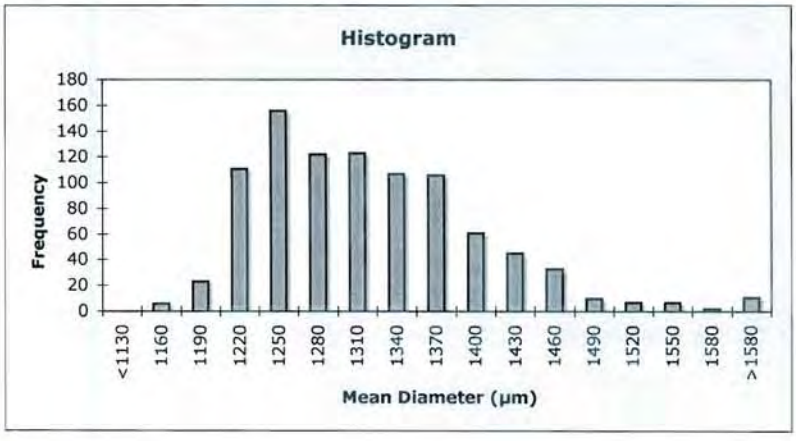
Data Report Form DRF-30A: Measurement of Over-coated Particle Diameter

Procedure:	AGR-CHAR-DAM-30 Rev. 0
Operator:	Andrew K. Kercher
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09021701\
Sample ID:	LEU06-OP1-B01
Sample Description:	AGR-2 UCO Variant, from G73J-14-93074A
Folder name containing processed data:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09021701_output\

Number of particles analyzed:	930
Mean of the average diameter of each particle (μm):	1304.0
Standard deviation in the average diameter of each particle (μm):	86

Distribution of the average particle diameter (top binned)

Mean Diameter (μm)	*Frequency*
<1130	0
1160	6
1190	23
1220	111
1250	156
1280	122
1310	123
1340	107
1370	106
1400	61
1430	45
1460	33
1490	10
1520	7
1550	7
1580	2
>1580	11



Andrew K. Kercher
Operator

February 18, 2009
Date

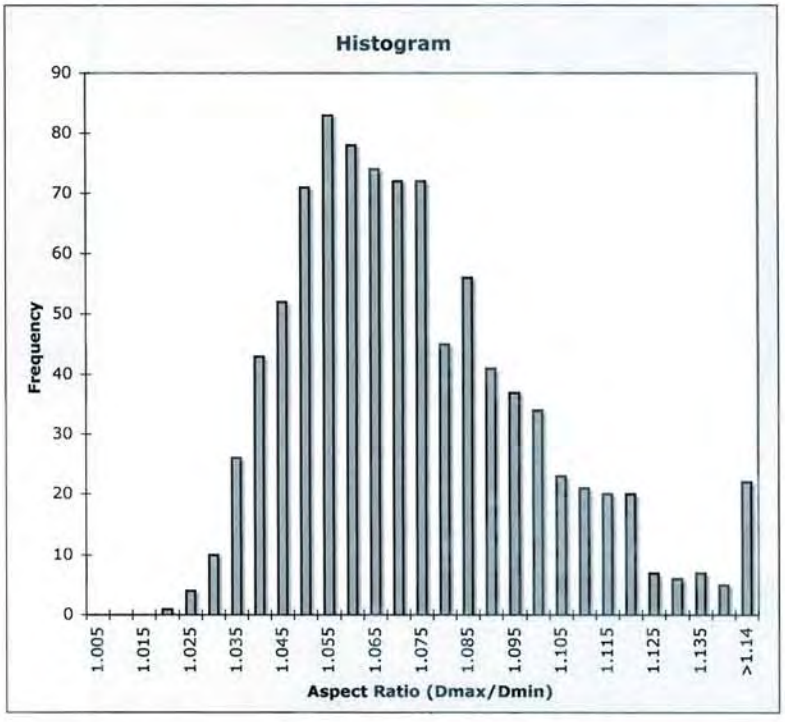
Data Report Form DRF-30B: Measurement of Over-coated Particle Aspect Ratio (Dmax/Dmin)

Procedure:	AGR-CHAR-DAM-30 Rev. 0
Operator:	Andrew K. Kercher
Folder name containing images:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09021701\
Sample ID:	LEU06-OP1-B01
Sample Description:	AGR-2 UCO Variant, from G73J-14-93074A
Folder name containing processed data:	\\mc-agr\AGR\ImageProcessing\Completed_Shadow\P09021701_output\

Number of particles analyzed:	930
Average particle aspect ratio:	1.072

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	4
1.030	10
1.035	26
1.040	43
1.045	52
1.050	71
1.055	83
1.060	78
1.065	74
1.070	72
1.075	72
1.080	45
1.085	56
1.090	41
1.095	37
1.100	34
1.105	23
1.110	21
1.115	20
1.120	20
1.125	7
1.130	6
1.135	7
1.140	5
>1.14	22



Operator

February 18, 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:	LEU06-OP1
Particle Lot Description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\ParticleWeight\W09011401_DRF22R1.xls

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Weight of particles (g):	0.3084	0.2907	0.2819	0.2955	0.2635
Number of particles:	160	149	141	146	134
Average weight/particle (g):	1.928E-03	1.951E-03	1.999E-03	2.024E-03	1.966E-03

Mean average weight/particle (g):	1.974E-03
Standard error in mean average weight/particle (g):	1.72E-05

Dixie Barker
Operator

1-14-09
Date

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

Procedure:	AGR-CHAR-DAM-22 Rev. 1
Operator:	Dixie Barker
Particle Lot ID:	LEU06-OP1
Particle Lot Description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\ParticleWeight\W09011402_DRF22R1.xls

	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
Weight of particles (g):	0.2504	0.2551	0.3345	0.3145	0.3432
Number of particles:	125	131	169	159	172
Average weight/particle (g):	2.003E-03	1.947E-03	1.979E-03	1.978E-03	1.995E-03

Mean average weight/particle (g):	1.981E-03
Standard error in mean average weight/particle (g):	9.60E-06

Dixie Barker
Operator

1-14-09
Date

7 Characterization of compacts

This section contains acceptance testing data on the compact lot LEU06-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, 135 compacts were selected from LEU06-OP1-G001 through G180 for use. Compacts with obvious processing defects, chips, or undesirable dimensions were sorted out and not included in the 135 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 135 compact lot from which random representative samples were drawn for characterization. As instructed in AGR-CHAR-PIP-12R1, these 135 compacts were randomized and relabeled as LEU06-OP1-Z001 through Z135. 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 LEU06-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 LEU06-OP1-Z compacts

Compact ID numbers:	047, 108, 027, 074, 120	058, 024, 131, 111, 023	016, 005, 094, 031, 001	089, 003, 063, 078, 015	129, 032, 083, 035, 018	122, 013, 099, 037, 051	070, 126, 057, 069, 098	059, 014, 062, 073, 040	Mean	Standard Deviation
Number of compacts:	5	5	5	5	5	5	5	5		
Iron										
Deconsolidation-leach (DRF-26A) (μg):	16.60	15.09	15.69	17.03	11.48	11.64	11.48	11.60		
Burn-leach (DRF-26B) (μg):	12.05	35.05	7.04	5.63	5.81	5.38	5.22	6.19		
Total leached (μg):	28.64	50.14	22.72	22.66	17.29	17.02	16.70	17.79		
Fe outside SiC (μg/compact):	**5.73**	**10.03**	**4.54**	**4.53**	**3.46**	**3.40**	**3.34**	**3.56**	**4.82**	**2.26**
Chromium										
Deconsolidation-leach (DRF-26A) (μg):	2.01	3.88	1.86	2.69	3.12	4.04	3.26	2.87		
Burn-leach (DRF-26B) (μg):	1.02	0.82	0.84	0.87	0.86	0.86	0.93	0.86		
Total leached (μg):	3.03	4.69	2.69	3.56	3.98	4.90	4.19	3.73		
Cr outside SiC (μg/compact):	**0.61**	**0.94**	**0.54**	**0.71**	**0.80**	**0.98**	**0.84**	**0.75**	**0.77**	**0.15**
Manganese										
Deconsolidation-leach (DRF-26A) (μg):	3.16	3.25	3.28	3.28	2.87	2.91	2.87	2.90		
Burn-leach (DRF-26B) (μg):	0.51	1.23	0.50	0.49	12.74	1.01	1.01	1.00		
Total leached (μg):	3.67	4.48	3.78	3.77	15.61	3.92	3.88	3.90		
Mn outside SiC (μg/compact):	**0.73**	**0.90**	**0.76**	**0.75**	**3.12**	**0.78**	**0.78**	**0.78**	**1.08**	**0.83**
Cobalt										
Deconsolidation-leach (DRF-26A) (μg):	1.28	1.32	1.33	1.33	1.17	1.18	1.17	1.18		
Burn-leach (DRF-26B) (μg):	0.41	0.40	0.40	0.40	0.42	0.41	0.41	0.41		
Total leached (μg):	1.70	1.72	1.74	1.73	1.59	1.59	1.58	1.58		
Co outside SiC (μg/compact):	**0.34**	**0.34**	**0.35**	**0.35**	**0.32**	**0.32**	**0.32**	**0.32**	**0.33**	**0.01**
Nickel										
Deconsolidation-leach (DRF-26A) (μg):	6.32	6.50	6.56	6.56	5.74	5.82	5.74	5.80		
Burn-leach (DRF-26B) (μg):	2.03	1.98	1.99	1.97	2.08	2.02	2.02	2.00		
Total leached (μg):	8.35	8.48	8.55	8.53	7.82	7.84	7.76	7.80		
Ni outside SiC (μg/compact):	**1.67**	**1.70**	**1.71**	**1.71**	**1.56**	**1.57**	**1.55**	**1.56**	**1.63**	**0.07**
Transition Metals										
Cr+Mn+Co+Ni outside SiC (μg/compact):	**3.35**	**3.88**	**3.35**	**3.52**	**5.80**	**3.65**	**3.48**	**3.40**	**3.80**	**0.83**
Calcium										
Deconsolidation-leach (DRF-26A) (μg):	44.36	140.52	11.41	51.71	443.99	239.27	781.69	196.58		
Burn-leach (DRF-26B) (μg):	239.61	145.50	185.57	174.17	111.28	145.34	112.11	92.81		
Total leached (μg):	283.97	286.02	196.98	225.88	555.27	384.61	893.80	289.39		
Ca outside SiC (μg/compact):	**56.79**	**57.20**	**39.40**	**45.18**	**111.05**	**76.92**	**178.76**	**57.88**	**77.90**	**46.45**
Aluminum										
Deconsolidation-leach (DRF-26A) (μg):	114.04	171.17	171.09	112.98	66.28	97.24	73.58	68.82		
Burn-leach (DRF-26B) (μg):	51.85	57.03	42.97	42.48	66.11	62.37	65.75	63.73		
Total leached (μg):	165.89	228.21	214.06	155.47	132.39	159.60	139.33	132.55		
Al outside SiC (μg/compact):	**33.18**	**45.64**	**42.81**	**31.09**	**26.48**	**31.92**	**27.87**	**26.51**	**33.19**	**7.29**
Titanium										
Deconsolidation-leach (DRF-26A) (μg):	14.49	28.36	21.19	20.82	17.21	32.89	27.17	21.74		
Burn-leach (DRF-26B) (μg):	26.11	21.87	22.02	19.72	29.69	21.33	25.23	27.92		
Total leached (μg):	40.59	50.23	43.21	40.54	46.90	54.22	52.40	49.66		
Ti outside SiC (μg/compact):	**8.12**	**10.05**	**8.64**	**8.11**	**9.38**	**10.84**	**10.48**	**9.93**	**9.44**	**1.06**
Vanadium										
Deconsolidation-leach (DRF-26A) (μg):	42.05	50.63	44.74	48.42	39.64	49.26	44.88	38.60		
Burn-leach (DRF-26B) (μg):	57.18	56.53	60.56	56.78	60.06	60.06	59.39	61.58		
Total leached (μg):	99.23	107.17	105.30	105.20	99.70	109.32	104.26	100.18		
V outside SiC (μg/compact):	**19.85**	**21.43**	**21.06**	**21.04**	**19.94**	**21.86**	**20.85**	**20.04**	**20.76**	**0.74**
Titanium and Vanadium										
Ti + V outside SiC (μg/compact):	**27.96**	**31.48**	**29.70**	**29.15**	**29.32**	**32.71**	**31.33**	**29.97**	**30.20**	**1.53**

Table 7-2: Summary of uranium contamination and SiC defect analysis for LEU06-OP1-Z compacts

Compact ID numbers	Number of compacts	Effective number of exposed kernels before burn	Number of kernels leached after burn
047, 108, 027, 074, 120	5	0.0	0
058, 024, 131, 111, 023	5	2.0	0
016, 005, 094, 031, 001	5	1.0	0
089, 003, 063, 078, 015	5	1.0	0
129, 032, 083, 035, 018	5	3.0	0
122, 013, 099, 037, 051	5	1.8	0
070, 126, 057, 069, 098	5	0.0	0
059, 014, 062, 073, 040	5	1.0	0
Total:	**40**	**9.9**	**0**

Four compacts were measured to be slightly outside of the specified limits for compact length, with the shortest being 0.132 mm shorter than the 25.02 mm lower limit and the longest being 0.036 mm longer than the 25.40 mm upper limit. These minor deviations are not expected to affect the compact performance and were not associated by significant deviations in the compacting force or matrix density. It was therefore determined that the compacts could be used as is. This was documented on ORNL non-conformance report NCR-X-MSTD-AGR-10-01.

The measured calcium impurity content in the compacts was above the specified upper limit. However, it was determined that the cause of the measured value being too high was likely due to uncertainty in the analysis, as opposed to an actual high concentration of calcium in the compacts. Accurate analysis of calcium is difficult due to the need to use the peak from the ^{44}Ca isotope for the mass spectrometry (the ^{40}Ca peak overlaps with other peaks in the spectrum). The abundance of this isotope is only 2%, which results in a large multiplier on the measurement uncertainty. It can be seen in Table 7-1 that the measured calcium impurity data for the second set of 20 compacts was more than twice that obtained for the first set of 20 compacts, which is statistically unlikely. The leach solutions from the second set of 20 compacts was re-analyzed and the new results were lower (Table 7-3). In fact, the impurity analysis data in Table 7-3 alone would result in an acceptance test value of 49.6, which would pass the specification. Comparison of the two sets of analyses clearly indicates a relatively large uncertainty in the measured value for calcium. Comparison of the results for all 8 sample groups indicates that the values obtained in the first analysis of the second set of 20 compacts were probably erroneously high. In addition, the current upper limit on the calcium impurity level of 50 μg/compact is thought to be conservative and a slightly higher calcium impurity level is not expected to adversely affect fuel performance. It was therefore determined that the compacts could be used as is. This was documented on ORNL non-conformance report NCR-X-MSTD-AGR-10-02.

Table 7-3: Summary of impurity analysis for LEU06-OP1-Z compacts after re-analysis of second set of 20 compacts

Compact ID numbers:	047, 108, 027, 074, 120	058, 024, 131, 111, 023	016, 005, 094, 031, 001	089, 003, 063, 078, 015	129, 032, 083, 035, 018	122, 013, 099, 037, 051	070, 126, 057, 069, 098	059, 014, 062, 073, 040	Mean	Standard Deviation
Number of compacts:	5	5	5	5	5	5	5	5		
Iron										
Deconsolidation-leach (DRF-26A) (μg):	16.60	15.09	15.69	17.03	11.82	11.99	11.82	11.95		
Burn-leach (DRF-26B) (μg):	12.05	35.05	7.04	5.63	5.81	5.38	5.22	6.19		
Total leached (μg):	28.64	50.14	22.72	22.66	17.64	17.37	17.04	18.13		
Fe outside SiC (μg/compact):	**5.73**	**10.03**	**4.54**	**4.53**	**3.53**	**3.47**	**3.41**	**3.63**	**4.86**	**2.24**
Chromium										
Deconsolidation-leach (DRF-26A) (μg):	2.01	3.88	1.86	2.69	1.87	2.34	2.10	1.71		
Burn-leach (DRF-26B) (μg):	1.02	0.82	0.84	0.87	0.86	0.86	0.93	0.86		
Total leached (μg):	3.03	4.69	2.69	3.56	2.73	3.20	3.03	2.58		
Cr outside SiC (μg/compact):	**0.61**	**0.94**	**0.54**	**0.71**	**0.55**	**0.64**	**0.61**	**0.52**	**0.64**	**0.14**
Manganese										
Deconsolidation-leach (DRF-26A) (μg):	3.16	3.25	3.28	3.28	0.55	0.56	0.55	0.55		
Burn-leach (DRF-26B) (μg):	0.51	1.23	0.50	0.49	12.74	1.01	1.01	1.00		
Total leached (μg):	3.67	4.48	3.78	3.77	13.29	1.57	1.56	1.55		
Mn outside SiC (μg/compact):	**0.73**	**0.90**	**0.76**	**0.75**	**2.66**	**0.31**	**0.31**	**0.31**	**0.84**	**0.77**
Cobalt										
Deconsolidation-leach (DRF-26A) (μg):	1.28	1.32	1.33	1.33	0.46	0.47	0.46	0.47		
Burn-leach (DRF-26B) (μg):	0.41	0.40	0.40	0.40	0.42	0.41	0.41	0.41		
Total leached (μg):	1.70	1.72	1.74	1.73	0.89	0.88	0.88	0.88		
Co outside SiC (μg/compact):	**0.34**	**0.34**	**0.35**	**0.35**	**0.18**	**0.18**	**0.18**	**0.18**	**0.26**	**0.09**
Nickel										
Deconsolidation-leach (DRF-26A) (μg):	6.32	6.50	6.56	6.56	2.30	2.33	2.30	2.32		
Burn-leach (DRF-26B) (μg):	2.03	1.98	1.99	1.97	2.08	2.02	2.02	2.00		
Total leached (μg):	8.35	8.48	8.55	8.53	4.38	4.35	4.32	4.32		
Ni outside SiC (μg/compact):	**1.67**	**1.70**	**1.71**	**1.71**	**0.88**	**0.87**	**0.86**	**0.86**	**1.28**	**0.44**
Transition Metals										
Cr+Mn+Co+Ni outside SiC (μg/compact):	**3.35**	**3.88**	**3.35**	**3.52**	**4.26**	**2.00**	**1.96**	**1.87**	**3.02**	**0.94**
Calcium										
Deconsolidation-leach (DRF-26A) (μg):	44.36	140.52	11.41	51.71	83.08	67.02	22.34	4.56		
Burn-leach (DRF-26B) (μg):	239.61	145.50	185.57	174.17	111.28	145.34	112.11	92.81		
Total leached (μg):	283.97	286.02	196.98	225.88	194.36	212.36	134.45	97.37		
Ca outside SiC (μg/compact):	**56.79**	**57.20**	**39.40**	**45.18**	**38.87**	**42.47**	**26.89**	**19.47**	**40.78**	**13.10**
Aluminum										
Deconsolidation-leach (DRF-26A) (μg):	114.04	171.17	171.09	112.98	55.07	70.71	60.61	51.05		
Burn-leach (DRF-26B) (μg):	51.85	57.03	42.97	42.48	66.11	62.37	65.75	63.73		
Total leached (μg):	165.89	228.21	214.06	155.47	121.18	133.08	126.35	114.78		
Al outside SiC (μg/compact):	**33.18**	**45.64**	**42.81**	**31.09**	**24.24**	**26.62**	**25.27**	**22.96**	**31.48**	**8.61**
Titanium										
Deconsolidation-leach (DRF-26A) (μg):	14.49	28.36	21.19	20.82	15.55	27.19	24.59	18.83		
Burn-leach (DRF-26B) (μg):	26.11	21.87	22.02	19.72	29.69	21.33	25.23	27.92		
Total leached (μg):	40.59	50.23	43.21	40.54	45.24	48.51	49.82	46.76		
Ti outside SiC (μg/compact):	**8.12**	**10.05**	**8.64**	**8.11**	**9.05**	**9.70**	**9.96**	**9.35**	**9.12**	**0.78**
Vanadium										
Deconsolidation-leach (DRF-26A) (μg):	42.05	50.63	44.74	48.42	37.92	40.77	38.34	39.73		
Burn-leach (DRF-26B) (μg):	57.18	56.53	60.56	56.78	60.06	60.06	59.39	61.58		
Total leached (μg):	99.23	107.17	105.30	105.20	97.98	100.83	97.72	101.32		
V outside SiC (μg/compact):	**19.85**	**21.43**	**21.06**	**21.04**	**19.60**	**20.17**	**19.54**	**20.26**	**20.37**	**0.72**
Titanium and Vanadium										
Ti + V outside SiC (μg/compact):	**27.96**	**31.48**	**29.70**	**29.15**	**28.64**	**29.87**	**29.51**	**29.61**	**29.49**	**1.02**

After compacts were electrolytically deconsolidated and leached, uranium was detected at a level equivalent to ~10 kernels out of the ~127448 particles leached. This corresponds to a binomial distribution defect fraction of ≤1.4E-4 at 95% confidence, which is above the specified limit of ≤2.0E-5. Analysis of as-coated TRISO particles from the same batch (G73J-14-93074A) 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 non-conformance was not related to the compacting and characterization activities at ORNL, the non-conformance 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.

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

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Compact lot ID:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Compact ID numbers of compacts not consumed by acceptance testing:	002 004 006 008 009 010 011 012 017 019 020 021 022 025 026 028 029 030 033 034 036 038 039 041 042 043 044 045 046 048 049 050 052 053 055 056 060 061 065 066 067 068 071 072 075 076 077 079 080 081 082 084 085 086 087 088 090 091 092 093 095 096 097 100 101 102 103 104 105 106 109 112 113 114 116 117 118 119 121 123 124 125 127 128 130 132 133 134

Property	Measured Data				Specification	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
	Mean (x)	Std. Dev. (s)	Measurements (n)	k or t value	INL SPC-923 Revison 3				
Uranium loading (gU/compact)	1.256	0.002	6	2.015	1.265 ± 0.07	A = x - ts/√n ≥ 1.195	1.254	pass	DRF-25
						B = x + ts/√n ≤ 1.335	1.258	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)	4.82	2.26	8	1.895	mean ≤ 25	B = x + ts/√n ≤ 25	6.3	pass	IRF-12B DRF-26
				4.353	dispersion ≤0.01 ≥ 100	D = x + √3ks < 100	21.9	pass	
Chromium content outside SiC (µg/compact)	0.77	0.15	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	0.9	pass	IRF-12B DRF-26
Manganese content outside SiC (µg/compact)	1.08	0.83	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	1.6	pass	IRF-12B DRF-26
Cobalt content outside SiC (µg/compact)	0.33	0.01	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	0.3	pass	IRF-12B DRF-26
Nickel content outside SiC (µg/compact)	1.63	0.07	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	1.7	pass	IRF-12B DRF-26
Cr + Mn + Co + Ni content outside SiC (µg/compact)	3.80	0.83	8	4.353	dispersion ≤0.01 ≥ 200	D = x + √3ks < 200	10.1	pass	IRF-12B DRF-26
Calcium content outside SiC (µg/compact)	77.90	46.45	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	109.0	fail	IRF-12B DRF-26
Aluminum content outside SiC (µg/compact)	33.19	7.29	8	1.895	mean ≤ 50	B = x + ts/√n ≤ 50	38.1	pass	IRF-12B DRF-26
Ti + V content outside SiC (µg/compact)	30.20	1.53	8	1.895	mean ≤ 240	B = x + ts/√n ≤ 240	31.2	pass	IRF-12B DRF-26

Property	Measured Data		Specification	Acceptance Criteria	Acceptance Test Value	Pass or fail	Data Records
	# of compacts	# of particles	INL SPC-923 Revison 2				
Uranium contamination fraction (g exposed U/gram U in compact)	40	127448	≤ 2.0×10^{-5}	≤1 effectively exposed kernel in ≥237192 particles or ≤2 effectively exposed kernels in ≥314788 particles	9.9	fail	IRF-12C DRF-26
Defective SiC coating fraction (fraction of total particles)	40	127448	≤ 1.0×10^{-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	63724	≤ 1.0×10^{-4}	≤1 with excessive U dispersion in ≥47437 particles or ≤2 with excessive U dispersion in ≥62956 particles	0	pass	DRF-28
Defective OPyC coating fraction (fraction of total particles)	1	3186	≤ 0.01	≤6 cracked or missing OPyC in ≥1182 particles	0	pass	DRF-27

Comments

Four compacts were outside of the length specification by -0.017 mm, -0.005 mm, -0.132 mm, and +0.036 mm. This non-conformance was documented on ORNL NCR-X-MSTD-AGR-10-01 with a disposition of use as is.
The measured Ca impurity was above the specified limit. The reported high calcium level is thought to be a result of measurement uncertainty, rather than an actual high calcium content in the compacts. This non-conformance was documented on ORNL NCR-X-MSTD-AGR-10-02 with a disposition of use as is.
A 10/127448 uranium contamination fraction is above the specified limit and corresponds to <1.4e-4 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.
LBL analysis was halted after 40 compacts were analyzed due to the high defect fraction. The remaining compacts slated for LBL were added to list of compacts not consumed by QC testing.

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:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	047, 108, 027, 074, 120	058, 024, 131, 111, 023	016, 005, 094, 031, 001	089, 003, 063, 078, 015	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Deconsolidation-leach (DRF-26A) (µg):	16.60	15.09	15.69	17.03		
Burn-leach (DRF-26B) (µg):	12.05	35.05	7.04	5.63		
Total leached (µg):	28.64	50.14	22.72	22.66		
Fe outside SiC (µg/compact):	**5.73**	**10.03**	**4.54**	**4.53**	**6.21**	**2.61**
Chromium						
Deconsolidation-leach (DRF-26A) (µg):	2.01	3.88	1.86	2.69		
Burn-leach (DRF-26B) (µg):	1.02	0.82	0.84	0.87		
Total leached (µg):	3.03	4.69	2.69	3.56		
Cr outside SiC (µg/compact):	**0.61**	**0.94**	**0.54**	**0.71**	**0.70**	**0.17**
Manganese						
Deconsolidation-leach (DRF-26A) (µg):	3.16	3.25	3.28	3.28		
Burn-leach (DRF-26B) (µg):	0.51	1.23	0.50	0.49		
Total leached (µg):	3.67	4.48	3.78	3.77		
Mn outside SiC (µg/compact):	**0.73**	**0.90**	**0.76**	**0.75**	**0.78**	**0.08**
Cobalt						
Deconsolidation-leach (DRF-26A) (µg):	1.28	1.32	1.33	1.33		
Burn-leach (DRF-26B) (µg):	0.41	0.40	0.40	0.40		
Total leached (µg):	1.70	1.72	1.74	1.73		
Co outside SiC (µg/compact):	**0.34**	**0.34**	**0.35**	**0.35**	**0.344**	**0.004**
Nickel						
Deconsolidation-leach (DRF-26A) (µg):	6.32	6.50	6.56	6.56		
Burn-leach (DRF-26B) (µg):	2.03	1.98	1.99	1.97		
Total leached (µg):	8.35	8.48	8.55	8.53		
Ni outside SiC (µg/compact):	**1.67**	**1.70**	**1.71**	**1.71**	**1.70**	**0.02**
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):	**3.35**	**3.88**	**3.35**	**3.52**	**3.52**	**0.25**
Calcium						
Deconsolidation-leach (DRF-26A) (µg):	44.36	140.52	11.41	51.71		
Burn-leach (DRF-26B) (µg):	239.61	145.50	185.57	174.17		
Total leached (µg):	283.97	286.02	196.98	225.88		
Ca outside SiC (µg/compact):	**56.79**	**57.20**	**39.40**	**45.18**	**49.64**	**8.82**
Aluminum						
Deconsolidation-leach (DRF-26A) (µg):	114.04	171.17	171.09	112.98		
Burn-leach (DRF-26B) (µg):	51.85	57.03	42.97	42.48		
Total leached (µg):	165.89	228.21	214.06	155.47		
Al outside SiC (µg/compact):	**33.18**	**45.64**	**42.81**	**31.09**	**38.18**	**7.13**
Titanium						
Deconsolidation-leach (DRF-26A) (µg):	14.49	28.36	21.19	20.82		
Burn-leach (DRF-26B) (µg):	26.11	21.87	22.02	19.72		
Total leached (µg):	40.59	50.23	43.21	40.54		
Ti outside SiC (µg/compact):	**8.12**	**10.05**	**8.64**	**8.11**	**8.73**	**0.91**
Vanadium						
Deconsolidation-leach (DRF-26A) (µg):	42.05	50.63	44.74	48.42		
Burn-leach (DRF-26B) (µg):	57.18	56.53	60.56	56.78		
Total leached (µg):	99.23	107.17	105.30	105.20		
V outside SiC (µg/compact):	**19.85**	**21.43**	**21.06**	**21.04**	**20.84**	**0.69**
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):	**27.96**	**31.48**	**29.70**	**29.15**	**29.57**	**1.46**

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:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	129, 032, 083, 035, 018	122, 013, 099, 037, 051	070, 126, 057, 069, 098	059, 014, 062, 073, 040	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Deconsolidation-leach (DRF-26A) (µg):	11.48	11.64	11.48	11.60		
Burn-leach (DRF-26B) (µg):	5.81	5.38	5.22	6.19		
Total leached (µg):	17.29	17.02	16.70	17.79		
Fe outside SiC (µg/compact):	**3.46**	**3.40**	**3.34**	**3.56**	**3.44**	**0.09**
Chromium						
Deconsolidation-leach (DRF-26A) (µg):	3.12	4.04	3.26	2.87		
Burn-leach (DRF-26B) (µg):	0.86	0.86	0.93	0.86		
Total leached (µg):	3.98	4.90	4.19	3.73		
Cr outside SiC (µg/compact):	**0.80**	**0.98**	**0.84**	**0.75**	**0.84**	**0.10**
Manganese						
Deconsolidation-leach (DRF-26A) (µg):	2.87	2.91	2.87	2.90		
Burn-leach (DRF-26B) (µg):	12.74	1.01	1.01	1.00		
Total leached (µg):	15.61	3.92	3.88	3.90		
Mn outside SiC (µg/compact):	**3.12**	**0.78**	**0.78**	**0.78**	**1.37**	**1.17**
Cobalt						
Deconsolidation-leach (DRF-26A) (µg):	1.17	1.18	1.17	1.18		
Burn-leach (DRF-26B) (µg):	0.42	0.41	0.41	0.41		
Total leached (µg):	1.59	1.59	1.58	1.58		
Co outside SiC (µg/compact):	**0.32**	**0.32**	**0.32**	**0.32**	**0.317**	**0.001**
Nickel						
Deconsolidation-leach (DRF-26A) (µg):	5.74	5.82	5.74	5.80		
Burn-leach (DRF-26B) (µg):	2.08	2.02	2.02	2.00		
Total leached (µg):	7.82	7.84	7.76	7.80		
Ni outside SiC (µg/compact):	**1.56**	**1.57**	**1.55**	**1.56**	**1.561**	**0.007**
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):	**5.80**	**3.65**	**3.48**	**3.40**	**4.08**	**1.15**
Calcium						
Deconsolidation-leach (DRF-26A) (µg):	443.99	239.27	781.69	196.58		
Burn-leach (DRF-26B) (µg):	111.28	145.34	112.11	92.81		
Total leached (µg):	555.27	384.61	893.80	289.39		
Ca outside SiC (µg/compact):	**111.05**	**76.92**	**178.76**	**57.88**	**106.15**	**53.17**
Aluminum						
Deconsolidation-leach (DRF-26A) (µg):	66.28	97.24	73.58	68.82		
Burn-leach (DRF-26B) (µg):	66.11	62.37	65.75	63.73		
Total leached (µg):	132.39	159.60	139.33	132.55		
Al outside SiC (µg/compact):	**26.48**	**31.92**	**27.87**	**26.51**	**28.19**	**2.57**
Titanium						
Deconsolidation-leach (DRF-26A) (µg):	17.21	32.89	27.17	21.74		
Burn-leach (DRF-26B) (µg):	29.69	21.33	25.23	27.92		
Total leached (µg):	46.90	54.22	52.40	49.66		
Ti outside SiC (µg/compact):	**9.38**	**10.84**	**10.48**	**9.93**	**10.16**	**0.64**
Vanadium						
Deconsolidation-leach (DRF-26A) (µg):	39.64	49.26	44.88	38.60		
Burn-leach (DRF-26B) (µg):	60.06	60.06	59.39	61.58		
Total leached (µg):	99.70	109.32	104.26	100.18		
V outside SiC (µg/compact):	**19.94**	**21.86**	**20.85**	**20.04**	**20.67**	**0.89**
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):	**29.32**	**32.71**	**31.33**	**29.97**	**30.83**	**1.51**

QC Supervisor

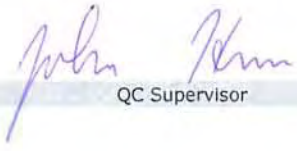
12-8-09

Date

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

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	047, 108, 027, 074, 120	058, 024, 131, 111, 023	016, 005, 094, 031, 001	089, 003, 063, 078, 015	Total
Number of compacts:	5	5	5	5	20
Effective number of exposed kernels:	0.0	2.0	1.0	1.0	4.1



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:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	129, 032, 083, 035, 018	122, 013, 099, 037, 051	070, 126, 057, 069, 098	059, 014, 062, 073, 040	Total
Number of compacts:	5	5	5	5	20
Effective number of exposed kernels:	3.0	1.8	0.0	1.0	5.8

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:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	047, 108, 027, 074, 120	058, 024, 131, 111, 023	016, 005, 094, 031, 001	089, 003, 063, 078, 015	Total
Number of compacts:	5	5	5	5	20
Number of leached kernels:	0	0	0	0	0

John Thum

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:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	129, 032, 083, 035, 018	122, 013, 099, 037, 051	070, 126, 057, 069, 098	059, 014, 062, 073, 040	Total
Number of compacts:	5	5	5	5	20
Number of leached kernels:	0	0	0	0	0

John Henn

QC Supervisor

12-8-09

Date

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

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Vertical height gauge calibration due date:	3/5/09
Pass-thru block calibration due date:	1/17/09
Digital caliper calibration due date:	7/22/09
Gauge blocks calibration due date:	11/7/12
Analytical balance calibration due date:	10/29/09

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	25.177	12.29	12.27	12.29	12.29	12.28	12.28	Y	6.2480	pass
Z002	25.025	12.28	12.28	12.29	12.29	12.28	12.29	Y	6.2585	pass
Z003	25.192	12.29	12.28	12.30	12.30	12.30	12.30	Y	6.2521	pass
Z004	25.133	12.28	12.27	12.29	12.29	12.28	12.28	Y	6.2508	pass
Z005	25.003	12.29	12.28	12.29	12.30	12.28	12.28	Y	6.2698	fail
Z006	25.099	12.27	12.27	12.28	12.28	12.28	12.27	Y	6.2659	pass
Z007	25.265	12.30	12.30	12.30	12.29	12.31	12.30	Y	6.2593	pass
Z008	25.242	12.28	12.28	12.28	12.28	12.28	12.28	Y	6.2668	pass
Z009	25.199	12.29	12.28	12.29	12.30	12.27	12.28	Y	6.2563	pass
Z010	25.031	12.28	12.29	12.29	12.29	12.27	12.27	Y	6.2610	pass
Z011	25.117	12.28	12.27	12.30	12.30	12.28	12.28	Y	6.2700	pass
Z012	25.318	12.29	12.30	12.30	12.30	12.28	12.28	Y	6.2599	pass
Z013	25.173	12.28	12.29	12.29	12.30	12.30	12.28	Y	6.2544	pass
Z014	25.235	12.29	12.29	12.30	12.30	12.29	12.29	Y	6.2670	pass
Z015	25.056	12.29	12.29	12.29	12.29	12.29	12.29	Y	6.2614	pass
Z016	25.098	12.27	12.28	12.28	12.28	12.28	12.28	Y	6.2468	pass
Z017	25.095	12.28	12.27	12.29	12.29	12.27	12.28	Y	6.2747	pass
Z018	25.153	12.27	12.28	12.29	12.29	12.27	12.27	Y	6.2644	pass
Z019	25.173	12.27	12.28	12.28	12.28	12.28	12.28	Y	6.2449	pass
Z020	25.314	12.27	12.27	12.27	12.28	12.27	12.27	Y	6.2618	pass
Z021	25.151	12.27	12.27	12.28	12.28	12.27	12.27	Y	6.2629	pass
Z022	25.205	12.27	12.28	12.29	12.28	12.27	12.27	Y	6.2646	pass
Z023	25.029	12.27	12.27	12.28	12.27	12.26	12.26	Y	6.2530	pass
Z024	25.150	12.28	12.28	12.29	12.29	12.27	12.27	Y	6.2486	pass
Z025	25.149	12.27	12.28	12.29	12.29	12.28	12.28	Y	6.2617	pass
Z026	25.225	12.28	12.27	12.29	12.28	12.27	12.28	Y	6.2462	pass
Z027	25.361	12.29	12.28	12.29	12.29	12.27	12.27	Y	6.2610	pass
Z028	25.189	12.29	12.28	12.29	12.29	12.28	12.27	Y	6.2592	pass
Z029	25.129	12.28	12.28	12.29	12.29	12.28	12.28	Y	6.2610	pass
Z030	25.319	12.29	12.27	12.28	12.28	12.28	12.27	Y	6.2406	pass
Z031	25.325	12.29	12.28	12.29	12.29	12.28	12.27	Y	6.2613	pass
Z032	25.173	12.27	12.27	12.29	12.29	12.29	12.28	Y	6.2553	pass
Z033	25.175	12.29	12.28	12.30	12.30	12.30	12.29	Y	6.2416	pass
Z034	25.191	12.28	12.27	12.29	12.29	12.28	12.29	Y	6.2526	pass
Z035	25.035	12.27	12.26	12.28	12.27	12.26	12.26	Y	6.2667	pass
Z036	25.225	12.27	12.27	12.29	12.29	12.29	12.28	Y	6.2640	pass
Z037	25.148	12.28	12.27	12.29	12.29	12.29	12.28	Y	6.2580	pass
Z038	25.151	12.26	12.26	12.27	12.27	12.26	12.27	Y	6.2720	pass
Z039	25.057	12.27	12.27	12.28	12.27	12.27	12.27	Y	6.2644	pass
Z040	25.215	12.28	12.28	12.29	12.29	12.28	12.28	Y	6.2623	pass

Comments

Compact LEU06-OP1-Z005 was 0.017 mm below the lower limit on compact length; this compact was used for LBL analysis.

Operator	2-27-09
QC Supervisor	7-24-09
QA Reviewer	12/8/09

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

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Vertical height gauge calibration due date:	3/5/09
Pass-thru block calibration due date:	1/17/09
Digital caliper calibration due date:	7/22/09
Gauge blocks calibration due date:	11/7/12
Analytical balance calibration due date:	10/29/09

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	25.263	12.28	12.27	12.29	12.29	12.28	12.28	Y	6.2570	pass
Z042	25.248	12.28	12.27	12.29	12.28	12.28	12.27	Y	6.2592	pass
Z043	25.059	12.28	12.27	12.29	12.29	12.27	12.28	Y	6.2391	pass
Z044	25.015	12.27	12.27	12.28	12.29	12.27	12.27	Y	6.2207	fail
Z045	25.111	12.27	12.27	12.29	12.28	12.26	12.27	Y	6.2484	pass
Z046	25.236	12.26	12.27	12.28	12.27	12.27	12.27	Y	6.2633	pass
Z047	25.305	12.27	12.26	12.28	12.29	12.27	12.26	Y	6.2569	pass
Z048	25.180	12.28	12.28	12.29	12.30	12.28	12.29	Y	6.2583	pass
Z049	25.340	12.28	12.28	12.29	12.29	12.28	12.28	Y	6.2775	pass
Z050	25.262	12.27	12.28	12.28	12.28	12.27	12.27	Y	6.2359	pass
Z051	25.133	12.26	12.26	12.29	12.28	12.26	12.27	Y	6.2435	pass
Z052	25.205	12.27	12.26	12.28	12.28	12.27	12.27	Y	6.2631	pass
Z053	25.123	12.27	12.26	12.28	12.29	12.28	12.27	Y	6.2432	pass
Z054	25.270	12.28	12.29	12.30	12.29	12.28	12.29	Y	6.2561	pass
Z055	25.175	12.28	12.28	12.29	12.28	12.28	12.27	Y	6.2570	pass
Z056	25.182	12.28	12.27	12.29	12.29	12.27	12.28	Y	6.2478	pass
Z057	25.101	12.26	12.26	12.27	12.27	12.26	12.27	Y	6.2667	pass
Z058	25.138	12.28	12.27	12.29	12.28	12.27	12.27	Y	6.2384	pass
Z059	25.292	12.28	12.27	12.28	12.28	12.28	12.28	Y	6.2209	pass
Z060	25.157	12.27	12.28	12.28	12.28	12.27	12.28	Y	6.2519	pass
Z061	25.148	12.28	12.29	12.28	12.28	12.27	12.28	Y	6.2444	pass
Z062	25.264	12.28	12.28	12.28	12.28	12.27	12.27	Y	6.2791	pass
Z063	25.214	12.27	12.27	12.29	12.28	12.27	12.27	Y	6.2543	pass
Z064	25.238	12.29	12.29	12.29	12.29	12.28	12.28	Y	6.2576	pass
Z065	25.130	12.28	12.28	12.29	12.29	12.28	12.29	Y	6.2621	pass
Z066	25.104	12.27	12.27	12.29	12.28	12.27	12.27	Y	6.2522	pass
Z067	25.118	12.27	12.28	12.29	12.29	12.28	12.28	Y	6.2561	pass
Z068	25.140	12.28	12.27	12.29	12.29	12.28	12.29	Y	6.2603	pass
Z069	25.201	12.29	12.29	12.30	12.28	12.29	12.29	Y	6.2533	pass
Z070	25.229	12.29	12.28	12.30	12.29	12.28	12.28	Y	6.2581	pass
Z071	25.052	12.29	12.28	12.30	12.30	12.29	12.29	Y	6.2468	pass
Z072	25.040	12.30	12.30	12.31	12.31	12.29	12.29	Y	6.2603	pass
Z073	25.185	12.29	12.29	12.30	12.30	12.29	12.29	Y	6.2516	pass
Z074	25.209	12.29	12.30	12.30	12.30	12.29	12.30	Y	6.2532	pass
Z075	25.097	12.29	12.29	12.30	12.31	12.29	12.30	Y	6.2532	pass
Z076	25.152	12.28	12.28	12.30	12.29	12.28	12.28	Y	6.2613	pass
Z077	25.255	12.29	12.29	12.30	12.29	12.28	12.29	Y	6.2377	pass
Z078	25.242	12.30	12.30	12.30	12.31	12.29	12.29	Y	6.2327	pass
Z079	25.179	12.29	12.28	12.30	12.30	12.29	12.30	Y	6.2446	pass
Z080	25.317	12.29	12.30	12.31	12.31	12.30	12.30	Y	6.2702	pass

Comments
Compact LEU06-OP1-Z044 was 0.005 mm below the lower limit on compact length; this compact is available for irradiation.

Operator — Date: 2-27-09

QC Supervisor — Date: 7-24-09

QA Reviewer — Date: 12/8/09

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

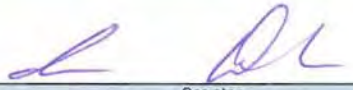
Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Vertical height gauge calibration due date:	3/5/09
Pass-thru block calibration due date:	1/17/09
Digital caliper calibration due date:	7/22/09
Gauge blocks calibration due date:	11/7/12
Analytical balance calibration due date:	10/29/09

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	25.355	12.30	12.30	12.30	12.30	12.30	12.30	Y	6.2417	pass
Z082	25.110	12.30	12.30	12.30	12.31	12.30	12.30	Y	6.2533	pass
Z083	25.318	12.29	12.29	12.29	12.29	12.28	12.28	Y	6.2374	pass
Z084	25.258	12.30	12.30	12.31	12.31	12.30	12.29	Y	6.2519	pass
Z085	25.157	12.30	12.29	12.32	12.31	12.30	12.30	Y	6.2596	pass
Z086	25.145	12.30	12.30	12.31	12.31	12.30	12.29	Y	6.2504	pass
Z087	24.888	12.29	12.29	12.30	12.29	12.28	12.28	Y	6.2392	fail
Z088	25.183	12.29	12.29	12.31	12.30	12.29	12.29	Y	6.2598	pass
Z089	25.185	12.29	12.29	12.30	12.30	12.29	12.29	Y	6.2505	pass
Z090	25.145	12.30	12.30	12.30	12.30	12.30	12.30	Y	6.2583	pass
Z091	25.312	12.30	12.30	12.31	12.30	12.29	12.29	Y	6.2630	pass
Z092	25.140	12.31	12.30	12.31	12.30	12.31	12.31	Y	6.2565	pass
Z093	25.222	12.29	12.29	12.31	12.31	12.29	12.30	Y	6.2624	pass
Z094	25.231	12.29	12.29	12.30	12.30	12.30	12.29	Y	6.2673	pass
Z095	25.052	12.29	12.30	12.30	12.30	12.29	12.28	Y	6.2520	pass
Z096	25.031	12.29	12.30	12.30	12.31	12.29	12.28	Y	6.2423	pass
Z097	25.208	12.30	12.30	12.30	12.30	12.30	12.29	Y	6.2401	pass
Z098	25.284	12.29	12.29	12.30	12.30	12.29	12.29	Y	6.2372	pass
Z099	25.436	12.31	12.31	12.31	12.31	12.30	12.30	Y	6.2695	fail
Z100	25.200	12.29	12.30	12.31	12.29	12.30	12.29	Y	6.2560	pass
Z101	25.130	12.31	12.31	12.31	12.31	12.31	12.31	Y	6.2578	pass
Z102	25.055	12.30	12.29	12.30	12.30	12.30	12.30	Y	6.2366	pass
Z103	25.105	12.29	12.30	12.31	12.31	12.29	12.28	Y	6.2580	pass
Z104	25.090	12.30	12.30	12.31	12.31	12.30	12.29	Y	6.2679	pass
Z105	25.030	12.30	12.30	12.30	12.31	12.30	12.30	Y	6.2612	pass
Z106	25.048	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.2478	pass
Z107	25.137	12.30	12.29	12.29	12.29	12.29	12.29	Y	6.2567	pass
Z108	25.361	12.30	12.29	12.31	12.30	12.29	12.29	Y	6.2392	pass
Z109	25.154	12.30	12.30	12.31	12.31	12.31	12.30	Y	6.2475	pass
Z110	25.261	12.29	12.28	12.30	12.30	12.29	12.29	Y	6.2650	pass
Z111	25.152	12.29	12.28	12.28	12.28	12.28	12.28	Y	6.2692	pass
Z112	25.214	12.29	12.29	12.31	12.31	12.30	12.31	Y	6.2469	pass
Z113	25.204	12.30	12.29	12.30	12.31	12.30	12.29	Y	6.2511	pass
Z114	25.133	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.2580	pass
Z115	25.306	12.30	12.28	12.30	12.30	12.29	12.29	Y	6.2647	pass
Z116	25.236	12.29	12.29	12.30	12.30	12.29	12.29	Y	6.2417	pass
Z117	25.213	12.28	12.29	12.30	12.30	12.28	12.29	Y	6.2448	pass
Z118	25.161	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.2392	pass
Z119	25.233	12.30	12.30	12.31	12.31	12.31	12.30	Y	6.2487	pass
Z120	25.130	12.30	12.31	12.29	12.30	12.30	12.29	Y	6.2484	pass

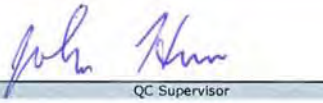
Comments
Compact LEU06-OP1-Z087 was 0.132 mm below the lower limit on compact length; this compact was used for LBL analysis.
Compact LEU06-OP1-Z099 was 0.036 mm over the upper limit on compact length; this compact was used for LBL analysis.



Operator

2-27-09

Date



QC Supervisor

7-24-09

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 Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Vertical height gauge calibration due date:	3/5/09
Pass-thru block calibration due date:	1/17/09
Digital caliper calibration due date:	7/22/09
Gauge blocks calibration due date:	11/7/12
Analytical balance calibration due date:	10/29/09

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	25.065	12.28	12.28	12.30	12.30	12.29	12.29	Y	6.2379	pass
Z122	25.172	12.29	12.29	12.30	12.31	12.29	12.29	Y	6.2575	pass
Z123	25.194	12.30	12.30	12.31	12.31	12.29	12.29	Y	6.2614	pass
Z124	25.192	12.29	12.29	12.30	12.30	12.29	12.29	Y	6.2667	pass
Z125	25.193	12.30	12.29	12.30	12.30	12.30	12.29	Y	6.2300	pass
Z126	25.309	12.30	12.28	12.31	12.30	12.29	12.30	Y	6.2488	pass
Z127	25.345	12.30	12.30	12.30	12.30	12.30	12.30	Y	6.2608	pass
Z128	25.299	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.2596	pass
Z129	25.154	12.30	12.30	12.31	12.32	12.31	12.31	Y	6.2658	pass
Z130	25.175	12.30	12.30	12.30	12.30	12.29	12.29	Y	6.2507	pass
Z131	25.040	12.28	12.29	12.31	12.30	12.30	12.30	Y	6.2226	pass
Z132	25.224	12.30	12.30	12.31	12.31	12.30	12.30	Y	6.2618	pass
Z133	25.176	12.29	12.29	12.30	12.30	12.29	12.29	Y	6.2496	pass
Z134	25.325	12.29	12.29	12.30	12.30	12.30	12.29	Y	6.2204	pass
Z135	25.199	12.28	12.28	12.29	12.29	12.29	12.29	Y	6.2543	pass
Z136										
Z137										
Z138										
Z139										
Z140										
Z141										
Z142										
Z143										
Z144										
Z145										
Z146										
Z147										
Z148										
Z149										
Z150										
Z151										
Z152										
Z153										
Z154										
Z155										
Z156										
Z157										
Z158										
Z159										
Z160										

Comments

Operator

2-27-09

Date

QC Supervisor

7-24-09

Date

QA Reviewer

12/8/09

Date

Data Report Form DRF-24B: Compact Matrix Density

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Average weight per TRISO particle (g):	1.036E-03
Average weight per overcoated particle (g):	1.977E-03
Average TRISO particle volume (cm3):	3.460E-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	6.2480	25.177	12.28	2.98	6.3268	3.3152	1.11	37%	1.56	pass
Z002	6.2585	25.025	12.29	2.97	6.3272	3.3152	1.11	37%	1.58	pass
Z003	6.2521	25.192	12.30	2.99	6.3275	3.3162	1.11	37%	1.56	pass
Z004	6.2508	25.133	12.28	2.98	6.3268	3.3152	1.11	37%	1.57	pass
Z005	6.2698	25.003	12.29	2.96	6.3264	3.3152	1.11	37%	1.59	pass
Z006	6.2659	25.099	12.28	2.97	6.3273	3.3152	1.11	37%	1.58	pass
Z007	6.2593	25.265	12.30	3.00	6.3271	3.3152	1.11	37%	1.55	pass
Z008	6.2668	25.242	12.28	2.99	6.3254	3.3142	1.11	37%	1.57	pass
Z009	6.2563	25.199	12.29	2.99	6.3264	3.3152	1.11	37%	1.56	pass
Z010	6.2610	25.031	12.28	2.97	6.3262	3.3152	1.11	37%	1.59	pass
Z011	6.2700	25.117	12.29	2.98	6.3273	3.3152	1.11	37%	1.58	pass
Z012	6.2599	25.318	12.29	3.00	6.3263	3.3152	1.11	37%	1.55	pass
Z013	6.2544	25.173	12.29	2.99	6.3280	3.3162	1.11	37%	1.56	pass
Z014	6.2670	25.235	12.29	3.00	6.3274	3.3162	1.11	37%	1.56	pass
Z015	6.2614	25.056	12.29	2.97	6.3268	3.3152	1.11	37%	1.58	pass
Z016	6.2468	25.098	12.28	2.97	6.3268	3.3152	1.11	37%	1.57	pass
Z017	6.2747	25.095	12.28	2.97	6.3278	3.3162	1.11	37%	1.59	pass
Z018	6.2644	25.153	12.28	2.98	6.3278	3.3162	1.11	37%	1.58	pass
Z019	6.2449	25.173	12.28	2.98	6.3276	3.3162	1.11	37%	1.56	pass
Z020	6.2618	25.314	12.27	2.99	6.3276	3.3162	1.11	37%	1.56	pass
Z021	6.2629	25.151	12.27	2.98	6.3277	3.3162	1.11	37%	1.58	pass
Z022	6.2646	25.205	12.28	2.98	6.3275	3.3162	1.11	37%	1.57	pass
Z023	6.2530	25.029	12.27	2.96	6.3270	3.3152	1.11	37%	1.59	pass
Z024	6.2486	25.150	12.28	2.98	6.3278	3.3162	1.11	37%	1.57	pass
Z025	6.2617	25.149	12.28	2.98	6.3270	3.3152	1.11	37%	1.57	pass
Z026	6.2462	25.225	12.28	2.99	6.3281	3.3162	1.11	37%	1.56	pass
Z027	6.2610	25.361	12.28	3.00	6.3281	3.3162	1.11	37%	1.55	pass
Z028	6.2592	25.189	12.28	2.98	6.3285	3.3162	1.11	37%	1.57	pass
Z029	6.2610	25.129	12.29	2.98	6.3261	3.3152	1.11	37%	1.57	pass
Z030	6.2406	25.319	12.28	3.00	6.3280	3.3162	1.11	37%	1.55	pass
Z031	6.2613	25.325	12.28	3.00	6.3268	3.3152	1.11	37%	1.56	pass
Z032	6.2553	25.173	12.28	2.98	6.3272	3.3152	1.11	37%	1.57	pass
Z033	6.2416	25.175	12.29	2.99	6.3268	3.3152	1.11	37%	1.56	pass
Z034	6.2526	25.191	12.28	2.99	6.3264	3.3152	1.11	37%	1.56	pass
Z035	6.2667	25.035	12.27	2.96	6.3269	3.3152	1.11	37%	1.59	pass
Z036	6.2640	25.225	12.28	2.99	6.3267	3.3152	1.11	37%	1.57	pass
Z037	6.2580	25.148	12.28	2.98	6.3271	3.3152	1.11	37%	1.57	pass
Z038	6.2720	25.151	12.27	2.97	6.3267	3.3152	1.11	37%	1.59	pass
Z039	6.2644	25.057	12.27	2.96	6.3262	3.3152	1.11	37%	1.59	pass
Z040	6.2623	25.215	12.28	2.99	6.3267	3.3152	1.11	37%	1.57	pass

Comments
Overcoated particle weight from combined results of 2 independent measurements (W09011401 and W09011402).

Operator	2-27-09 Date
QC Supervisor	7-24-09 Date
QA Reviewer	12/8/09 Date

Data Report Form DRF-24B: Compact Matrix Density

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Average weight per TRISO particle (g):	1.036E-03
Average weight per overcoated particle (g):	1.977E-03
Average TRISO particle volume (cm3):	3.460E-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	6.2570	25.263	12.28	2.99	6.3273	3.3152	1.11	37%	1.56	pass
Z042	6.2592	25.248	12.28	2.99	6.3271	3.3152	1.11	37%	1.56	pass
Z043	6.2391	25.059	12.28	2.97	6.3267	3.3152	1.11	37%	1.57	pass
Z044	6.2207	25.015	12.28	2.96	6.3266	3.3152	1.11	37%	1.57	pass
Z045	6.2484	25.111	12.27	2.97	6.3272	3.3152	1.11	37%	1.57	pass
Z046	6.2633	25.236	12.27	2.98	6.3274	3.3162	1.11	37%	1.57	pass
Z047	6.2569	25.305	12.27	2.99	6.3274	3.3162	1.11	37%	1.56	pass
Z048	6.2583	25.180	12.29	2.99	6.3279	3.3162	1.11	37%	1.57	pass
Z049	6.2775	25.340	12.28	3.00	6.3258	3.3152	1.11	37%	1.56	pass
Z050	6.2359	25.262	12.28	2.99	6.3271	3.3152	1.11	37%	1.55	pass
Z051	6.2435	25.133	12.27	2.97	6.3271	3.3152	1.11	37%	1.57	pass
Z052	6.2631	25.205	12.27	2.98	6.3272	3.3152	1.11	37%	1.57	pass
Z053	6.2432	25.123	12.28	2.97	6.3276	3.3162	1.11	37%	1.57	pass
Z054	6.2561	25.270	12.29	3.00	6.3279	3.3162	1.11	37%	1.56	pass
Z055	6.2570	25.175	12.28	2.98	6.3270	3.3152	1.11	37%	1.57	pass
Z056	6.2478	25.182	12.28	2.98	6.3268	3.3152	1.11	37%	1.56	pass
Z057	6.2667	25.101	12.27	2.97	6.3273	3.3152	1.11	37%	1.59	pass
Z058	6.2384	25.138	12.28	2.98	6.3270	3.3152	1.11	37%	1.56	pass
Z059	6.2209	25.292	12.28	2.99	6.3260	3.3152	1.11	37%	1.54	pass
Z060	6.2519	25.157	12.28	2.98	6.3279	3.3162	1.11	37%	1.57	pass
Z061	6.2444	25.148	12.28	2.98	6.3272	3.3152	1.11	37%	1.57	pass
Z062	6.2791	25.264	12.28	2.99	6.3263	3.3152	1.11	37%	1.57	pass
Z063	6.2543	25.214	12.28	2.98	6.3274	3.3162	1.11	37%	1.57	pass
Z064	6.2576	25.238	12.29	2.99	6.3272	3.3152	1.11	37%	1.56	pass
Z065	6.2621	25.130	12.29	2.98	6.3270	3.3152	1.11	37%	1.57	pass
Z066	6.2522	25.104	12.28	2.97	6.3262	3.3152	1.11	37%	1.58	pass
Z067	6.2561	25.118	12.28	2.98	6.3270	3.3152	1.11	37%	1.57	pass
Z068	6.2603	25.140	12.28	2.98	6.3264	3.3152	1.11	37%	1.57	pass
Z069	6.2533	25.201	12.29	2.99	6.3279	3.3162	1.11	37%	1.56	pass
Z070	6.2581	25.229	12.29	2.99	6.3260	3.3152	1.11	37%	1.56	pass
Z071	6.2468	25.052	12.29	2.97	6.3267	3.3152	1.11	37%	1.57	pass
Z072	6.2603	25.040	12.30	2.98	6.3270	3.3152	1.11	37%	1.58	pass
Z073	6.2516	25.185	12.29	2.99	6.3270	3.3152	1.11	37%	1.56	pass
Z074	6.2532	25.209	12.30	2.99	6.3271	3.3152	1.11	37%	1.56	pass
Z075	6.2532	25.097	12.30	2.98	6.3279	3.3162	1.11	37%	1.57	pass
Z076	6.2613	25.152	12.29	2.98	6.3273	3.3152	1.11	37%	1.57	pass
Z077	6.2377	25.255	12.29	3.00	6.3263	3.3152	1.11	37%	1.55	pass
Z078	6.2327	25.242	12.30	3.00	6.3282	3.3162	1.11	37%	1.54	pass
Z079	6.2446	25.179	12.29	2.99	6.3282	3.3162	1.11	37%	1.56	pass
Z080	6.2702	25.317	12.30	3.01	6.3278	3.3162	1.11	37%	1.55	pass

Comments

Operator — Date: 2-27-09

QC Supervisor — Date: 7-24-09

QA Reviewer — Date: 12/8/09

Data Report Form DRF-24B: Compact Matrix Density

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Average weight per TRISO particle (g):	1.036E-03
Average weight per overcoated particle (g):	1.977E-03
Average TRISO particle volume (cm3):	3.460E-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	6.2417	25.355	12.30	3.01	6.3276	3.3162	1.11	37%	1.54	pass
Z082	6.2533	25.110	12.30	2.98	6.3279	3.3162	1.11	37%	1.56	pass
Z083	6.2374	25.318	12.29	3.00	6.3273	3.3152	1.11	37%	1.54	pass
Z084	6.2519	25.258	12.30	3.00	6.3269	3.3152	1.11	37%	1.55	pass
Z085	6.2596	25.157	12.30	2.99	6.3271	3.3152	1.11	37%	1.56	pass
Z086	6.2504	25.145	12.30	2.99	6.3261	3.3152	1.11	37%	1.56	pass
Z087	6.2392	24.888	12.29	2.95	6.3257	3.3152	1.11	38%	1.59	pass
Z088	6.2598	25.183	12.30	2.99	6.3274	3.3162	1.11	37%	1.56	pass
Z089	6.2505	25.185	12.29	2.99	6.3273	3.3152	1.11	37%	1.56	pass
Z090	6.2583	25.145	12.30	2.99	6.3270	3.3152	1.11	37%	1.56	pass
Z091	6.2630	25.312	12.30	3.01	6.3276	3.3162	1.11	37%	1.55	pass
Z092	6.2565	25.140	12.31	2.99	6.3268	3.3152	1.11	37%	1.56	pass
Z093	6.2624	25.222	12.30	3.00	6.3276	3.3162	1.11	37%	1.56	pass
Z094	6.2673	25.231	12.30	3.00	6.3282	3.3162	1.11	37%	1.56	pass
Z095	6.2520	25.052	12.29	2.97	6.3286	3.3162	1.11	37%	1.57	pass
Z096	6.2423	25.031	12.30	2.97	6.3270	3.3152	1.11	37%	1.57	pass
Z097	6.2401	25.208	12.30	2.99	6.3282	3.3162	1.11	37%	1.55	pass
Z098	6.2372	25.284	12.29	3.00	6.3270	3.3152	1.11	37%	1.54	pass
Z099	6.2695	25.436	12.31	3.03	6.3264	3.3152	1.11	37%	1.54	pass
Z100	6.2560	25.200	12.30	2.99	6.3266	3.3152	1.11	37%	1.56	pass
Z101	6.2578	25.130	12.31	2.99	6.3271	3.3152	1.11	37%	1.56	pass
Z102	6.2366	25.055	12.30	2.98	6.3264	3.3152	1.11	37%	1.56	pass
Z103	6.2580	25.105	12.30	2.98	6.3270	3.3152	1.11	37%	1.57	pass
Z104	6.2679	25.090	12.30	2.98	6.3270	3.3152	1.11	37%	1.57	pass
Z105	6.2612	25.030	12.30	2.97	6.3279	3.3162	1.11	37%	1.58	pass
Z106	6.2478	25.048	12.30	2.98	6.3266	3.3152	1.11	37%	1.57	pass
Z107	6.2567	25.137	12.29	2.98	6.3274	3.3162	1.11	37%	1.57	pass
Z108	6.2392	25.361	12.30	3.01	6.3263	3.3152	1.11	37%	1.54	pass
Z109	6.2475	25.154	12.31	2.99	6.3278	3.3162	1.11	37%	1.56	pass
Z110	6.2650	25.261	12.29	3.00	6.3275	3.3162	1.11	37%	1.56	pass
Z111	6.2692	25.152	12.28	2.98	6.3272	3.3152	1.11	37%	1.58	pass
Z112	6.2469	25.214	12.30	3.00	6.3266	3.3152	1.11	37%	1.55	pass
Z113	6.2511	25.204	12.30	2.99	6.3271	3.3152	1.11	37%	1.56	pass
Z114	6.2580	25.133	12.30	2.99	6.3274	3.3162	1.11	37%	1.56	pass
Z115	6.2647	25.306	12.29	3.00	6.3279	3.3162	1.11	37%	1.55	pass
Z116	6.2417	25.236	12.29	3.00	6.3275	3.3162	1.11	37%	1.55	pass
Z117	6.2448	25.213	12.29	2.99	6.3266	3.3152	1.11	37%	1.56	pass
Z118	6.2392	25.161	12.30	2.99	6.3290	3.3162	1.11	37%	1.55	pass
Z119	6.2487	25.233	12.31	3.00	6.3265	3.3152	1.11	37%	1.55	pass
Z120	6.2484	25.130	12.30	2.99	6.3266	3.3152	1.11	37%	1.56	pass

Comments

Operator — Date: 2-27-09

QC Supervisor — Date: 7-24-09

QA Reviewer — Date: 12/8/09

Data Report Form DRF-24B: Compact Matrix Density

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Average weight per TRISO particle (g):	1.036E-03
Average weight per overcoated particle (g):	1.977E-03
Average TRISO particle volume (cm3):	3.460E-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	6.2379	25.065	12.29	2.97	6.3275	3.3162	1.11	37%	1.57	pass
Z122	6.2575	25.172	12.30	2.99	6.3278	3.3162	1.11	37%	1.56	pass
Z123	6.2614	25.194	12.30	2.99	6.3260	3.3152	1.11	37%	1.56	pass
Z124	6.2667	25.192	12.29	2.99	6.3265	3.3152	1.11	37%	1.57	pass
Z125	6.2300	25.193	12.30	2.99	6.3270	3.3152	1.11	37%	1.55	pass
Z126	6.2488	25.309	12.30	3.01	6.3281	3.3162	1.11	37%	1.54	pass
Z127	6.2608	25.345	12.30	3.01	6.3264	3.3152	1.11	37%	1.55	pass
Z128	6.2596	25.299	12.30	3.01	6.3272	3.3152	1.11	37%	1.55	pass
Z129	6.2658	25.154	12.31	2.99	6.3267	3.3152	1.11	37%	1.56	pass
Z130	6.2507	25.175	12.30	2.99	6.3279	3.3162	1.11	37%	1.56	pass
Z131	6.2226	25.040	12.30	2.97	6.3270	3.3152	1.11	37%	1.56	pass
Z132	6.2618	25.224	12.30	3.00	6.3279	3.3162	1.11	37%	1.56	pass
Z133	6.2496	25.176	12.29	2.99	6.3287	3.3162	1.11	37%	1.56	pass
Z134	6.2204	25.325	12.30	3.01	6.3276	3.3162	1.11	37%	1.53	pass
Z135	6.2543	25.199	12.29	2.99	6.3279	3.3162	1.11	37%	1.56	pass
Z136										
Z137										
Z138										
Z139										
Z140										
Z141										
Z142										
Z143										
Z144										
Z145										
Z146										
Z147										
Z148										
Z149										
Z150										
Z151										
Z152										
Z153										
Z154										
Z155										
Z156										
Z157										
Z158										
Z159										
Z160										

Comments

Operator — Date: 2-27-09

QC Supervisor — Date: 7-24-09

QA Reviewer — Date: 12/8/09

Data Report Form DRF-24C: Compact Tracking

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

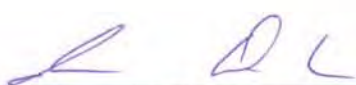
Compact Z Number	Compact G Number
Z001	G043
Z002	G165
Z003	G104
Z004	G040
Z005	G177
Z006	G158
Z007	G094
Z008	G142
Z009	G125
Z010	G154
Z011	G173
Z012	G128
Z013	G096
Z014	G123
Z015	G122
Z016	G055
Z017	G179
Z018	G095
Z019	G037
Z020	G087
Z021	G159
Z022	G075
Z023	G083
Z024	G109
Z025	G066
Z026	G036
Z027	G117
Z028	G099
Z029	G129
Z030	G008
Z031	G118
Z032	G126
Z033	G110
Z034	G124
Z035	G162
Z036	G130
Z037	G127
Z038	G176
Z039	G161
Z040	G093

Compact Z Number	Compact G Number
Z041	G116
Z042	G084
Z043	G028
Z044	G032
Z045	G073
Z046	G147
Z047	G078
Z048	G065
Z049	G143
Z050	G019
Z051	G033
Z052	G156
Z053	G027
Z054	G092
Z055	G053
Z056	G061
Z057	G160
Z058	G017
Z059	G009
Z060	G089
Z061	G112
Z062	G144
Z063	G041
Z064	G085
Z065	G137
Z066	G046
Z067	G121
Z068	G139
Z069	G068
Z070	G148
Z071	G030
Z072	G152
Z073	G115
Z074	G070
Z075	G090
Z076	G145
Z077	G013
Z078	G015
Z079	G057
Z080	G100

Compact Z Number	Compact G Number
Z081	G011
Z082	G067
Z083	G007
Z084	G105
Z085	G134
Z086	G131
Z087	G164
Z088	G074
Z089	G051
Z090	G101
Z091	G080
Z092	G133
Z093	G077
Z094	G006
Z095	G047
Z096	G114
Z097	G016
Z098	G005
Z099	G098
Z100	G049
Z101	G064
Z102	G060
Z103	G153
Z104	G163
Z105	G171
Z106	G108
Z107	G097
Z108	G021
Z109	G111
Z110	G138
Z111	G172
Z112	G062
Z113	G052
Z114	G132
Z115	G076
Z116	G014
Z117	G038
Z118	G004
Z119	G091
Z120	G069

Compact Z Number	Compact G Number
Z121	G034
Z122	G072
Z123	G135
Z124	G149
Z125	G018
Z126	G113
Z127	G136
Z128	G119
Z129	G141
Z130	G039
Z131	G035
Z132	G086
Z133	G058
Z134	G010
Z135	G103
Z136	
Z137	
Z138	
Z139	
Z140	
Z141	
Z142	
Z143	
Z144	
Z145	
Z146	
Z147	
Z148	
Z149	
Z150	
Z151	
Z152	
Z153	
Z154	
Z155	
Z156	
Z157	
Z158	
Z159	
Z160	

Comments



Operator

2-16-09

Date

Data Report Form DRF-24D: Compact Charge Weight

Procedure:	AGR-CHAR-DAM-24 Rev. 6
Operator:	Ivan Dunbar
Compact lot ID:	LEU06-OP1
Compact Lot description:	AGR-2 UCO Variant, from G73J-14-93074A
Filename:	\\mc-agr\AGR\CompactDimensions\LEU06-OP1_DRF24R6.xls

Analytical balance calibration due date:	10/29/09

Target compact charge weight (g):	6.3270
Allowable tolerance in compact charge weight (g):	0.0020
Average weight per overcoated particle (g):	1.977E-03
Approximate number of particles per compact:	3200
Average uranium loading per particle (g):	3.953E-04
Approximate uranium loading per compact (g):	1.265

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	6.3272	G046	6.3262	G091	6.3265	G136	6.3264
G002	6.3280	G047	6.3286	G092	6.3279	G137	6.3270
G003	6.3274	G048	6.3267	G093	6.3267	G138	6.3275
G004	6.3290	G049	6.3266	G094	6.3271	G139	6.3264
G005	6.3270	G050	6.3275	G095	6.3278	G140	6.3275
G006	6.3282	G051	6.3273	G096	6.3280	G141	6.3267
G007	6.3273	G052	6.3271	G097	6.3274	G142	6.3254
G008	6.3280	G053	6.3270	G098	6.3264	G143	6.3258
G009	6.3260	G054	6.3277	G099	6.3285	G144	6.3263
G010	6.3276	G055	6.3268	G100	6.3278	G145	6.3273
G011	6.3276	G056	6.3286	G101	6.3270	G146	6.3262
G012	6.3264	G057	6.3282	G102	6.3274	G147	6.3274
G013	6.3263	G058	6.3287	G103	6.3279	G148	6.3260
G014	6.3275	G059	6.3266	G104	6.3275	G149	6.3265
G015	6.3282	G060	6.3264	G105	6.3269	G150	6.3269
G016	6.3282	G061	6.3268	G106	6.3272	G151	6.3276
G017	6.3270	G062	6.3266	G107	6.3281	G152	6.3270
G018	6.3270	G063	6.3278	G108	6.3266	G153	6.3270
G019	6.3271	G064	6.3271	G109	6.3278	G154	6.3262
G020	6.3278	G065	6.3279	G110	6.3268	G155	6.3279
G021	6.3263	G066	6.3270	G111	6.3278	G156	6.3272
G022	6.3252	G067	6.3279	G112	6.3272	G157	6.3264
G023	6.3282	G068	6.3279	G113	6.3281	G158	6.3273
G024	6.3272	G069	6.3266	G114	6.3270	G159	6.3277
G025	6.3283	G070	6.3271	G115	6.3270	G160	6.3273
G026	6.3286	G071	6.3269	G116	6.3273	G161	6.3262
G027	6.3276	G072	6.3278	G117	6.3281	G162	6.3269
G028	6.3267	G073	6.3272	G118	6.3268	G163	6.3270
G029	6.3261	G074	6.3274	G119	6.3272	G164	6.3257
G030	6.3267	G075	6.3275	G120	6.3276	G165	6.3272
G031	6.3266	G076	6.3279	G121	6.3270	G166	6.3264
G032	6.3266	G077	6.3276	G122	6.3268	G167	6.3280
G033	6.3271	G078	6.3274	G123	6.3274	G168	6.3266
G034	6.3275	G079	6.3273	G124	6.3264	G169	6.3269
G035	6.3270	G080	6.3276	G125	6.3264	G170	6.3261
G036	6.3281	G081	6.3281	G126	6.3272	G171	6.3279
G037	6.3276	G082	6.3276	G127	6.3271	G172	6.3272
G038	6.3266	G083	6.3270	G128	6.3263	G173	6.3273
G039	6.3279	G084	6.3271	G129	6.3261	G174	6.3270
G040	6.3268	G085	6.3272	G130	6.3267	G175	6.3278
G041	6.3274	G086	6.3279	G131	6.3261	G176	6.3267
G042	6.3268	G087	6.3276	G132	6.3274	G177	6.3264
G043	6.3268	G088	6.3266	G133	6.3268	G178	6.3270
G044	6.3269	G089	6.3279	G134	6.3271	G179	6.3278
G045	6.3284	G090	6.3279	G135	6.3260	G180	6.3270

Comments
Overcoated particle weight from combined results of 2 independent measurements (W09011401 and W09011402).

[signature]	2-4-09
Operator	Date

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

Procedure:	AGR-CHAR-DAM-25 Rev. 2
Operator:	Fred Montgomery
Compact lot ID:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant fuel, from G73J-14-93074A
Filename:	\\mc-agr\AGR\UraniumLoading\LEU06-OP1-Z_DRF25R2.xls

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
Compact ID number:	Z007	Z054	Z064	Z107	Z110	Z135
First Leach						
Sample tube ID number:	U09022701	U09022702	U09022703	U09022704	U09022705	U09022706
Radiochemical laboratory analysis number:	1727-001	1727-002	1727-003	1727-004	1727-005	1727-006
Weight U in leach (g):	1.254	1.256	1.260	1.258	1.255	1.255
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:	U09030201	U09030202	U09030203	U09030204	U09030205	U09030206
Radiochemical laboratory analysis number:	1727-007	1727-008	1727-009	1727-010	1727-011	1727-012
Weight U in leach (g):	4.60E-05	6.34E-05	6.70E-05	3.71E-05	5.61E-05	3.81E-05
Uncertainty in weight U in leach (g):	4.60E-06	6.34E-06	6.70E-06	3.71E-06	5.61E-06	3.81E-06
Total Measured U						
Weight U in compact (g):	1.254	1.256	1.260	1.258	1.255	1.255
Uncertainty in weight U in compact (g):	0.005	0.005	0.005	0.005	0.005	0.005

Mean uranium loading (gU/compact):	1.256
Standard deviation in mean uranium loading (gU/compact):	0.002

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 = 100.26%; final known U recovery= 100.4%; blind titration U recovery= 100.07%. Uncertainty in Davies-Gray (0.4%) based on average of measured % recovery data for LEU06,07,08,09. Average U-235 enrichment: 14.00±0.04 wt.% Data checked against official results of analyses for RMAL1727 on 5/26/2009 by FCM

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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	047, 108, 027, 074, 120
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09030601	L09030901	
	Number of compacts:	5		
	Total volume of leach solution (ml):	116.0	200.0	
	Radiochemical laboratory analysis number:	1752-001	1752-006	
	Measured uranium concentration (µg/ml):	1.55E-01	4.83E-03	
	Uncertainty in uranium concentration (µg/ml):	1.55E-02	4.83E-04	
	Weight uranium leached (g):	1.80E-05	9.66E-07	1.89E-05
	Uncertainty in weight uranium leached (g):	1.80E-06	9.67E-08	1.80E-06
	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):	7.41E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	8.60	< 8.00	<16.60
	Weight of impurity in blank (µg):	< 6.44	< 7.44	
	Minimum corrected weight of impurity in sample (µg):	2.16	0.00	2.16
	Maximum corrected weight of impurity in sample (µg):	8.60	8.00	16.60
Cr	Measured concentration of impurity in sample (µg/ml):	8.73E-03	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.01	< 1.00	< 2.01
	Weight of impurity in blank (µg):	< 0.81	< 0.93	
	Minimum corrected weight of impurity in sample (µg):	0.21	0.00	0.21
	Maximum corrected weight of impurity in sample (µg):	1.01	1.00	2.01
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 1.16	< 2.00	< 3.16
	Weight of impurity in blank (µg):	< 1.61	< 1.86	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.16	2.00	3.16
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.47	< 0.81	< 1.28
	Weight of impurity in blank (µg):	< 0.65	< 0.76	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.47	0.81	1.28
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 2.32	< 4.00	< 6.32
	Weight of impurity in blank (µg):	< 3.22	< 3.72	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.32	4.00	6.32
Ca	Measured concentration of impurity in sample (µg/ml):	1.00E+00	3.22E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	116.00	64.40	180.40
	Weight of impurity in blank (µg):	71.65	87.23	
	Minimum corrected weight of impurity in sample (µg):	44.36	0.00	44.36
	Maximum corrected weight of impurity in sample (µg):	44.36	0.00	44.36
Al	Measured concentration of impurity in sample (µg/ml):	1.15E+00	1.16E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	133.40	23.20	156.60
	Weight of impurity in blank (µg):	36.39	6.18	
	Minimum corrected weight of impurity in sample (µg):	97.01	17.02	114.04
	Maximum corrected weight of impurity in sample (µg):	97.01	17.02	114.04
Ti	Measured concentration of impurity in sample (µg/ml):	5.85E-02	3.85E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	6.79	7.70	14.49
	Weight of impurity in blank (µg):	< 3.22	< 3.72	
	Minimum corrected weight of impurity in sample (µg):	3.57	3.98	7.55
	Maximum corrected weight of impurity in sample (µg):	6.79	7.70	14.49
V	Measured concentration of impurity in sample (µg/ml):	2.68E-01	5.48E-02	**V**
	Uncorrected weight of impurity in sample (µg):	31.09	10.96	42.05
	Weight of impurity in blank (µg):	< 0.81	< 0.93	
	Minimum corrected weight of impurity in sample (µg):	30.28	10.03	40.31
	Maximum corrected weight of impurity in sample (µg):	31.09	10.96	42.05

Comments

Data checked against RMAL1752 official results by FCM on 5/06/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	058, 024, 131, 111, 023
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
Deconsolidation-leach solution ID:		L09030602	L09030902	
Number of compacts:		5		
Total volume of leach solution (ml):		136.0	189.0	
Radiochemical laboratory analysis number:		1752-002	1752-007	
Measured uranium concentration (µg/ml):		5.44E+00	3.40E-01	
Uncertainty in uranium concentration (µg/ml):		5.44E-01	3.40E-02	
Weight uranium leached (g):		7.40E-04	6.43E-05	8.04E-04
Uncertainty in weight uranium leached (g):		7.41E-05	6.43E-06	7.43E-05
Effective number of exposed kernels:		1.9	0.2	2.0
Uncertainty in effective number of exposed kernels:		0.2	0.0	0.2
Fe	Measured concentration of impurity in sample (µg/ml):	5.54E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	7.53	< 7.56	<15.09
	Weight of impurity in blank (µg):	< 6.44	< 7.44	
	Minimum corrected weight of impurity in sample (µg):	1.09	0.00	1.09
	Maximum corrected weight of impurity in sample (µg):	7.53	7.56	15.09
Cr	Measured concentration of impurity in sample (µg/ml):	1.55E-02	9.36E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	2.11	1.77	3.88
	Weight of impurity in blank (µg):	< 0.81	< 0.93	
	Minimum corrected weight of impurity in sample (µg):	1.30	0.84	2.14
	Maximum corrected weight of impurity in sample (µg):	2.11	1.77	3.88
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 1.36	< 1.89	< 3.25
	Weight of impurity in blank (µg):	< 1.61	< 1.86	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.36	1.89	3.25
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.55	< 0.77	< 1.32
	Weight of impurity in blank (µg):	< 0.65	< 0.76	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.55	0.77	1.32
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 2.72	< 3.78	< 6.50
	Weight of impurity in blank (µg):	< 3.22	< 3.72	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.72	3.78	6.50
Ca	Measured concentration of impurity in sample (µg/ml):	1.56E+00	3.39E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	212.16	64.07	276.23
	Weight of impurity in blank (µg):	71.65	87.23	
	Minimum corrected weight of impurity in sample (µg):	140.52	0.00	140.52
	Maximum corrected weight of impurity in sample (µg):	140.52	0.00	140.52
Al	Measured concentration of impurity in sample (µg/ml):	1.27E+00	2.17E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	172.72	41.01	213.73
	Weight of impurity in blank (µg):	36.39	6.18	
	Minimum corrected weight of impurity in sample (µg):	136.33	34.84	171.17
	Maximum corrected weight of impurity in sample (µg):	136.33	34.84	171.17
Ti	Measured concentration of impurity in sample (µg/ml):	9.93E-02	7.86E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	13.50	14.86	28.36
	Weight of impurity in blank (µg):	< 3.22	< 3.72	
	Minimum corrected weight of impurity in sample (µg):	10.28	11.14	21.42
	Maximum corrected weight of impurity in sample (µg):	13.50	14.86	28.36
V	Measured concentration of impurity in sample (µg/ml):	2.76E-01	6.93E-02	**V**
	Uncorrected weight of impurity in sample (µg):	37.54	13.10	50.63
	Weight of impurity in blank (µg):	< 0.81	< 0.93	
	Minimum corrected weight of impurity in sample (µg):	36.73	12.17	48.90
	Maximum corrected weight of impurity in sample (µg):	37.54	13.10	50.63

Comments

Data checked against RMAL1752 official results by FCM on 5/06/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	016, 005, 094, 031, 001
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09030603	L09030903	
	Number of compacts:	5		
	Total volume of leach solution (ml):	131.0	197.0	
	Radiochemical laboratory analysis number:	1752-003	1752-008	
	Measured uranium concentration (µg/ml):	2.96E+00	1.36E-01	
	Uncertainty in uranium concentration (µg/ml):	2.96E-01	1.36E-02	
	Weight uranium leached (g):	3.88E-04	2.68E-05	4.15E-04
	Uncertainty in weight uranium leached (g):	3.88E-05	2.68E-06	3.89E-05
	Effective number of exposed kernels:	1.0	0.1	1.0
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	5.96E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	7.81	< 7.88	<15.69
	Weight of impurity in blank (µg):	< 6.44	< 7.44	
	Minimum corrected weight of impurity in sample (µg):	1.37	0.00	1.37
	Maximum corrected weight of impurity in sample (µg):	7.81	7.88	15.69
Cr	Measured concentration of impurity in sample (µg/ml):	6.66E-03	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.87	< 0.99	< 1.86
	Weight of impurity in blank (µg):	< 0.81	< 0.93	
	Minimum corrected weight of impurity in sample (µg):	0.07	0.00	0.07
	Maximum corrected weight of impurity in sample (µg):	0.87	0.99	1.86
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 1.31	< 1.97	< 3.28
	Weight of impurity in blank (µg):	< 1.61	< 1.86	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.31	1.97	3.28
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.53	< 0.80	< 1.33
	Weight of impurity in blank (µg):	< 0.65	< 0.76	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.53	0.80	1.33
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 2.62	< 3.94	< 6.56
	Weight of impurity in blank (µg):	< 3.22	< 3.72	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.62	3.94	6.56
Ca	Measured concentration of impurity in sample (µg/ml):	6.34E-01	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	83.05	<19.70	<102.75
	Weight of impurity in blank (µg):	71.65	87.23	
	Minimum corrected weight of impurity in sample (µg):	11.41	0.00	11.41
	Maximum corrected weight of impurity in sample (µg):	11.41	0.00	11.41
Al	Measured concentration of impurity in sample (µg/ml):	1.47E+00	1.07E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	192.57	21.08	213.65
	Weight of impurity in blank (µg):	36.39	6.18	
	Minimum corrected weight of impurity in sample (µg):	156.18	14.90	171.09
	Maximum corrected weight of impurity in sample (µg):	156.18	14.90	171.09
Ti	Measured concentration of impurity in sample (µg/ml):	8.40E-02	5.17E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	11.00	10.18	21.19
	Weight of impurity in blank (µg):	< 3.22	< 3.72	
	Minimum corrected weight of impurity in sample (µg):	7.78	6.46	14.25
	Maximum corrected weight of impurity in sample (µg):	11.00	10.18	21.19
V	Measured concentration of impurity in sample (µg/ml):	2.74E-01	4.49E-02	**V**
	Uncorrected weight of impurity in sample (µg):	35.89	8.85	44.74
	Weight of impurity in blank (µg):	< 0.81	< 0.93	
	Minimum corrected weight of impurity in sample (µg):	35.09	7.92	43.00
	Maximum corrected weight of impurity in sample (µg):	35.89	8.85	44.74

Comments

Data checked against RMAL1752 official results by FCM on 5/06/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	089, 003, 063, 078, 015
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09030604	L09030904	
	Number of compacts:	5		
	Total volume of leach solution (ml):	136.0	192.0	
	Radiochemical laboratory analysis number:	1752-004	1752-009	
	Measured uranium concentration (µg/ml):	2.66E+00	1.16E-01	
	Uncertainty in uranium concentration (µg/ml):	2.66E-01	1.16E-02	
	Weight uranium leached (g):	3.62E-04	2.23E-05	3.84E-04
	Uncertainty in weight uranium leached (g):	3.62E-05	2.23E-06	3.63E-05
	Effective number of exposed kernels:	0.9	0.1	1.0
	Uncertainty in effective number of exposed kernels:	0.1	0.0	0.1
Fe	Measured concentration of impurity in sample (µg/ml):	6.76E-02	4.08E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	9.19	7.83	17.03
	Weight of impurity in blank (µg):	< 6.44	< 7.44	
	Minimum corrected weight of impurity in sample (µg):	2.75	0.39	3.15
	Maximum corrected weight of impurity in sample (µg):	9.19	7.83	17.03
Cr	Measured concentration of impurity in sample (µg/ml):	1.17E-02	5.72E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.59	1.10	2.69
	Weight of impurity in blank (µg):	< 0.81	< 0.93	
	Minimum corrected weight of impurity in sample (µg):	0.79	0.17	0.95
	Maximum corrected weight of impurity in sample (µg):	1.59	1.10	2.69
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 1.36	< 1.92	< 3.28
	Weight of impurity in blank (µg):	< 1.61	< 1.86	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.36	1.92	3.28
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.55	< 0.78	< 1.33
	Weight of impurity in blank (µg):	< 0.65	< 0.76	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.55	0.78	1.33
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 2.72	< 3.84	< 6.56
	Weight of impurity in blank (µg):	< 3.22	< 3.72	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.72	3.84	6.56
Ca	Measured concentration of impurity in sample (µg/ml):	9.07E-01	2.40E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	123.35	46.08	169.43
	Weight of impurity in blank (µg):	71.65	87.23	
	Minimum corrected weight of impurity in sample (µg):	51.71	0.00	51.71
	Maximum corrected weight of impurity in sample (µg):	51.71	0.00	51.71
Al	Measured concentration of impurity in sample (µg/ml):	9.39E-01	1.45E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	127.70	27.84	155.54
	Weight of impurity in blank (µg):	36.39	6.18	
	Minimum corrected weight of impurity in sample (µg):	91.32	21.66	112.98
	Maximum corrected weight of impurity in sample (µg):	91.32	21.66	112.98
Ti	Measured concentration of impurity in sample (µg/ml):	8.39E-02	4.90E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	11.41	9.41	20.82
	Weight of impurity in blank (µg):	< 3.22	< 3.72	
	Minimum corrected weight of impurity in sample (µg):	8.19	5.69	13.88
	Maximum corrected weight of impurity in sample (µg):	11.41	9.41	20.82
V	Measured concentration of impurity in sample (µg/ml):	2.86E-01	4.96E-02	**V**
	Uncorrected weight of impurity in sample (µg):	38.90	9.52	48.42
	Weight of impurity in blank (µg):	< 0.81	< 0.93	
	Minimum corrected weight of impurity in sample (µg):	38.09	8.59	46.68
	Maximum corrected weight of impurity in sample (µg):	38.90	9.52	48.42

Comments

Data checked against RMAL1752 official results by FCM on 5/06/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	Deconsolidation Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09030605	L09030905	
	Number of compacts:	None		
	Total volume of leach solution (ml):	161.0	186.0	
	Radiochemical laboratory analysis number:	1752-005	1752-010	
	Measured uranium concentration (µg/ml):	2.85E-03	1.88E-03	
	Uncertainty in uranium concentration (µg/ml):	2.85E-04	1.88E-04	
	Weight uranium leached (g):	4.59E-07	3.50E-07	8.09E-07
	Uncertainty in weight uranium leached (g):	4.59E-08	3.50E-08	5.77E-08
	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 (µg/ml):	< 4.00E-02	< 4.00E-02	Fe
	Total weight of leached impurity (µg):	< 6.44	< 7.44	<13.88
Cr	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.81	< 0.93	< 1.74
Mn	Measured concentration (µg/ml):	< 1.00E-02	< 1.00E-02	Mn
	Total weight of leached impurity (µg):	< 1.61	< 1.86	< 3.47
Co	Measured concentration (µg/ml):	< 4.06E-03	< 4.06E-03	Co
	Total weight of leached impurity (µg):	< 0.65	< 0.76	< 1.41
Ni	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ni
	Total weight of leached impurity (µg):	< 3.22	< 3.72	< 6.94
Ca	Measured concentration (µg/ml):	4.45E-01	4.69E-01	Ca
	Total weight of leached impurity (µg):	71.65	87.23	158.88
Al	Measured concentration (µg/ml):	2.26E-01	3.32E-02	Al
	Total weight of leached impurity (µg):	36.39	6.18	42.56
Ti	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ti
	Total weight of leached impurity (µg):	< 3.22	< 3.72	< 6.94
V	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	V
	Total weight of leached impurity (µg):	< 0.81	< 0.93	< 1.74

Comments

Data checked against RMAL1752 official results by FCM on 5/06/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	047, 108, 027, 074, 120
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	BL09032101	BL09032301	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.0	52.5	
	Radiochemical laboratory analysis number:	1794-003	1794-008	
	Measured uranium concentration (µg/ml):	7.47E-02	1.99E-03	
	Uncertainty in uranium concentration (µg/ml):	7.47E-03	1.99E-04	
	Weight uranium leached (g):	3.66E-06	1.04E-07	3.76E-06
	Uncertainty in weight uranium leached (g):	3.69E-07	1.05E-08	3.69E-07
	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):	2.03E-01	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	9.95	< 2.10	<12.05
	Weight of impurity in blank (µg):	< 2.06	< 2.02	
	Minimum corrected weight of impurity in sample (µg):	7.89	0.00	7.89
	Maximum corrected weight of impurity in sample (µg):	9.95	2.10	12.05
Cr	Measured concentration of impurity in sample (µg/ml):	1.54E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.75	< 0.26	< 1.02
	Weight of impurity in blank (µg):	< 0.26	< 0.25	
	Minimum corrected weight of impurity in sample (µg):	0.50	0.00	0.50
	Maximum corrected weight of impurity in sample (µg):	0.75	0.26	1.02
Mn	Measured concentration of impurity in sample (µg/ml):	< 5.00E-03	< 5.00E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.25	< 0.26	< 0.51
	Weight of impurity in blank (µg):	< 0.26	< 0.25	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.25	0.26	0.51
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.20	< 0.21	< 0.41
	Weight of impurity in blank (µg):	< 0.21	< 0.21	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.20	0.21	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 0.98	< 1.05	< 2.03
	Weight of impurity in blank (µg):	< 1.03	< 1.01	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.98	1.05	2.03
Ca	Measured concentration of impurity in sample (µg/ml):	4.89E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	239.61	< 5.25	<244.86
	Weight of impurity in blank (µg):	< 5.15	26.97	
	Minimum corrected weight of impurity in sample (µg):	234.46	0.00	234.46
	Maximum corrected weight of impurity in sample (µg):	239.61	0.00	239.61
Al	Measured concentration of impurity in sample (µg/ml):	1.28E+00	7.17E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	62.72	3.76	66.48
	Weight of impurity in blank (µg):	10.87	4.96	
	Minimum corrected weight of impurity in sample (µg):	51.85	0.00	51.85
	Maximum corrected weight of impurity in sample (µg):	51.85	0.00	51.85
Ti	Measured concentration of impurity in sample (µg/ml):	5.04E-01	2.69E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	24.70	1.41	26.11
	Weight of impurity in blank (µg):	< 1.03	< 1.01	
	Minimum corrected weight of impurity in sample (µg):	23.67	0.40	24.07
	Maximum corrected weight of impurity in sample (µg):	24.70	1.41	26.11
V	Measured concentration of impurity in sample (µg/ml):	1.16E+00	1.18E-02	**V**
	Uncorrected weight of impurity in sample (µg):	56.84	0.62	57.46
	Weight of impurity in blank (µg):	< 0.26	0.28	
	Minimum corrected weight of impurity in sample (µg):	56.58	0.34	56.92
	Maximum corrected weight of impurity in sample (µg):	56.84	0.34	57.18

Comments

Data checked against RMAL1794 official data by fcm on 5/12/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	058, 024, 131, 111, 023
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	BL09032102	BL09032302	
	Number of compacts:	5		
	Total volume of leach solution (ml):	48.5	50.5	
	Radiochemical laboratory analysis number:	1794-004	1794-009	
	Measured uranium concentration (µg/ml):	1.43E-01	1.43E-03	
	Uncertainty in uranium concentration (µg/ml):	1.43E-02	1.43E-04	
	Weight uranium leached (g):	6.94E-06	7.22E-08	7.01E-06
	Uncertainty in weight uranium leached (g):	7.00E-07	7.28E-09	7.00E-07
	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):	6.81E-01	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	33.03	< 2.02	<35.05
	Weight of impurity in blank (µg):	< 2.06	< 2.02	
	Minimum corrected weight of impurity in sample (µg):	30.97	0.00	30.97
	Maximum corrected weight of impurity in sample (µg):	33.03	2.02	35.05
Cr	Measured concentration of impurity in sample (µg/ml):	1.16E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.56	< 0.25	< 0.82
	Weight of impurity in blank (µg):	< 0.26	< 0.25	
	Minimum corrected weight of impurity in sample (µg):	0.31	0.00	0.31
	Maximum corrected weight of impurity in sample (µg):	0.56	0.25	0.82
Mn	Measured concentration of impurity in sample (µg/ml):	< 5.00E-03	1.96E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.24	0.99	< 1.23
	Weight of impurity in blank (µg):	< 0.26	< 0.25	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.74	0.74
	Maximum corrected weight of impurity in sample (µg):	0.24	0.99	1.23
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.20	< 0.21	< 0.40
	Weight of impurity in blank (µg):	< 0.21	< 0.21	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.20	0.21	0.40
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 0.97	< 1.01	< 1.98
	Weight of impurity in blank (µg):	< 1.03	< 1.01	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.97	1.01	1.98
Ca	Measured concentration of impurity in sample (µg/ml):	3.00E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	145.50	< 5.05	<150.55
	Weight of impurity in blank (µg):	< 5.15	26.97	
	Minimum corrected weight of impurity in sample (µg):	140.35	0.00	140.35
	Maximum corrected weight of impurity in sample (µg):	145.50	0.00	145.50
Al	Measured concentration of impurity in sample (µg/ml):	1.40E+00	6.57E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	67.90	3.32	71.22
	Weight of impurity in blank (µg):	10.87	4.96	
	Minimum corrected weight of impurity in sample (µg):	57.03	0.00	57.03
	Maximum corrected weight of impurity in sample (µg):	57.03	0.00	57.03
Ti	Measured concentration of impurity in sample (µg/ml):	4.30E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	20.86	< 1.01	<21.87
	Weight of impurity in blank (µg):	< 1.03	< 1.01	
	Minimum corrected weight of impurity in sample (µg):	19.83	0.00	19.83
	Maximum corrected weight of impurity in sample (µg):	20.86	1.01	21.87
V	Measured concentration of impurity in sample (µg/ml):	1.16E+00	1.09E-02	**V**
	Uncorrected weight of impurity in sample (µg):	56.26	0.55	56.81
	Weight of impurity in blank (µg):	< 0.26	0.28	
	Minimum corrected weight of impurity in sample (µg):	56.00	0.27	56.28
	Maximum corrected weight of impurity in sample (µg):	56.26	0.27	56.53

Comments

Data checked against RMAL1794 official data by fcm on 5/12/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	016, 005, 094, 031, 001
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	BL09032103	BL09032303	
	Number of compacts:	5		
	Total volume of leach solution (ml):	48.5	51.0	
	Radiochemical laboratory analysis number:	1794-005	1794-010	
	Measured uranium concentration (µg/ml):	9.80E-02	1.49E-03	
	Uncertainty in uranium concentration (µg/ml):	9.80E-03	1.49E-04	
	Weight uranium leached (g):	4.75E-06	7.60E-08	4.83E-06
	Uncertainty in weight uranium leached (g):	4.80E-07	7.66E-09	4.80E-07
	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):	1.03E-01	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	5.00	< 2.04	< 7.04
	Weight of impurity in blank (µg):	< 2.06	< 2.02	
	Minimum corrected weight of impurity in sample (µg):	2.94	0.00	2.94
	Maximum corrected weight of impurity in sample (µg):	5.00	2.04	7.04
Cr	Measured concentration of impurity in sample (µg/ml):	1.20E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.58	< 0.26	< 0.84
	Weight of impurity in blank (µg):	< 0.26	< 0.25	
	Minimum corrected weight of impurity in sample (µg):	0.32	0.00	0.32
	Maximum corrected weight of impurity in sample (µg):	0.58	0.26	0.84
Mn	Measured concentration of impurity in sample (µg/ml):	< 5.00E-03	< 5.00E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.24	< 0.26	< 0.50
	Weight of impurity in blank (µg):	< 0.26	< 0.25	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.26	0.50
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.20	< 0.21	< 0.40
	Weight of impurity in blank (µg):	< 0.21	< 0.21	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.20	0.21	0.40
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 0.97	< 1.02	< 1.99
	Weight of impurity in blank (µg):	< 1.03	< 1.01	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.97	1.02	1.99
Ca	Measured concentration of impurity in sample (µg/ml):	2.91E+00	1.40E+00	**Ca**
	Uncorrected weight of impurity in sample (µg):	141.14	71.40	212.54
	Weight of impurity in blank (µg):	< 5.15	26.97	
	Minimum corrected weight of impurity in sample (µg):	135.99	44.43	180.42
	Maximum corrected weight of impurity in sample (µg):	141.14	44.43	185.57
Al	Measured concentration of impurity in sample (µg/ml):	1.11E+00	8.86E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	53.84	4.52	58.35
	Weight of impurity in blank (µg):	10.87	4.96	
	Minimum corrected weight of impurity in sample (µg):	42.97	0.00	42.97
	Maximum corrected weight of impurity in sample (µg):	42.97	0.00	42.97
Ti	Measured concentration of impurity in sample (µg/ml):	4.33E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	21.00	< 1.02	<22.02
	Weight of impurity in blank (µg):	< 1.03	< 1.01	
	Minimum corrected weight of impurity in sample (µg):	19.97	0.00	19.97
	Maximum corrected weight of impurity in sample (µg):	21.00	1.02	22.02
V	Measured concentration of impurity in sample (µg/ml):	1.24E+00	1.36E-02	**V**
	Uncorrected weight of impurity in sample (µg):	60.14	0.69	60.83
	Weight of impurity in blank (µg):	< 0.26	0.28	
	Minimum corrected weight of impurity in sample (µg):	59.88	0.42	60.30
	Maximum corrected weight of impurity in sample (µg):	60.14	0.42	60.56

Comments

Data checked against RMAL1794 official data by fcm on 5/12/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	089, 003, 063, 078, 015
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	BL09032104	BL09032304	
	Number of compacts:	5		
	Total volume of leach solution (ml):	48.5	50.0	
	Radiochemical laboratory analysis number:	1794-006	1794-011	
	Measured uranium concentration (µg/ml):	9.78E-02	1.01E-03	
	Uncertainty in uranium concentration (µg/ml):	9.78E-03	1.01E-04	
	Weight uranium leached (g):	4.74E-06	5.05E-08	4.79E-06
	Uncertainty in weight uranium leached (g):	4.79E-07	5.09E-09	4.79E-07
	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):	7.49E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.63	< 2.00	< 5.63
	Weight of impurity in blank (µg):	< 2.06	< 2.02	
	Minimum corrected weight of impurity in sample (µg):	1.57	0.00	1.57
	Maximum corrected weight of impurity in sample (µg):	3.63	2.00	5.63
Cr	Measured concentration of impurity in sample (µg/ml):	1.28E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.62	< 0.25	< 0.87
	Weight of impurity in blank (µg):	< 0.26	< 0.25	
	Minimum corrected weight of impurity in sample (µg):	0.36	0.00	0.36
	Maximum corrected weight of impurity in sample (µg):	0.62	0.25	0.87
Mn	Measured concentration of impurity in sample (µg/ml):	< 5.00E-03	< 5.00E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.24	< 0.25	< 0.49
	Weight of impurity in blank (µg):	< 0.26	< 0.25	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.25	0.49
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.20	< 0.20	< 0.40
	Weight of impurity in blank (µg):	< 0.21	< 0.21	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.20	0.20	0.40
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 0.97	< 1.00	< 1.97
	Weight of impurity in blank (µg):	< 1.03	< 1.01	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.97	1.00	1.97
Ca	Measured concentration of impurity in sample (µg/ml):	2.91E+00	1.20E+00	**Ca**
	Uncorrected weight of impurity in sample (µg):	141.14	60.00	201.14
	Weight of impurity in blank (µg):	< 5.15	26.97	
	Minimum corrected weight of impurity in sample (µg):	135.99	33.03	169.02
	Maximum corrected weight of impurity in sample (µg):	141.14	33.03	174.17
Al	Measured concentration of impurity in sample (µg/ml):	1.10E+00	6.76E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	53.35	3.38	56.73
	Weight of impurity in blank (µg):	10.87	4.96	
	Minimum corrected weight of impurity in sample (µg):	42.48	0.00	42.48
	Maximum corrected weight of impurity in sample (µg):	42.48	0.00	42.48
Ti	Measured concentration of impurity in sample (µg/ml):	3.86E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	18.72	< 1.00	<19.72
	Weight of impurity in blank (µg):	< 1.03	< 1.01	
	Minimum corrected weight of impurity in sample (µg):	17.69	0.00	17.69
	Maximum corrected weight of impurity in sample (µg):	18.72	1.00	19.72
V	Measured concentration of impurity in sample (µg/ml):	1.16E+00	1.60E-02	**V**
	Uncorrected weight of impurity in sample (µg):	56.26	0.80	57.06
	Weight of impurity in blank (µg):	< 0.26	0.28	
	Minimum corrected weight of impurity in sample (µg):	56.00	0.52	56.53
	Maximum corrected weight of impurity in sample (µg):	56.26	0.52	56.78

Comments

Data checked against RMAL1794 official data by fcm on 5/12/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	Burn-Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_01.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	BL09032105	BL09032305	
	Number of compacts:	None		
	Total volume of leach solution (ml):	51.5	50.5	
	Radiochemical laboratory analysis number:	1794-007	1794-012	
	Measured uranium concentration (µg/ml):	2.94E-03	< 5.00E-04	
	Uncertainty in uranium concentration (µg/ml):	2.94E-04		
	Weight uranium leached (g):	1.51E-07	<2.53E-08	1.77E-07
	Uncertainty in weight uranium leached (g):	1.53E-08		
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:	0.0		
Fe	Measured concentration (µg/ml):	< 4.00E-02	< 4.00E-02	Fe
	Total weight of leached impurity (µg):	< 2.06	< 2.02	< 4.08
Cr	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.26	< 0.25	< 0.51
Mn	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	Mn
	Total weight of leached impurity (µg):	< 0.26	< 0.25	< 0.51
Co	Measured concentration (µg/ml):	< 4.06E-03	< 4.06E-03	Co
	Total weight of leached impurity (µg):	< 0.21	< 0.21	< 0.41
Ni	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ni
	Total weight of leached impurity (µg):	< 1.03	< 1.01	< 2.04
Ca	Measured concentration (µg/ml):	< 1.00E-01	5.34E-01	Ca
	Total weight of leached impurity (µg):	< 5.15	26.97	<32.12
Al	Measured concentration (µg/ml):	2.11E-01	9.82E-02	Al
	Total weight of leached impurity (µg):	10.87	4.96	15.83
Ti	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ti
	Total weight of leached impurity (µg):	< 1.03	< 1.01	< 2.04
V	Measured concentration (µg/ml):	< 5.00E-03	5.49E-03	V
	Total weight of leached impurity (µg):	< 0.26	0.28	< 0.53

Comments

Data checked against RMAL1794 official data by fcm on 5/12/2009

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	129, 032, 083, 035, 018
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09032601	L09033101	
	Number of compacts:	5		
	Total volume of leach solution (ml):	146.0	141.0	
	Radiochemical laboratory analysis number:	1807-009	1807-014	
	Measured uranium concentration (µg/ml):	7.94E+00	3.08E-01	
	Uncertainty in uranium concentration (µg/ml):	7.94E-01	3.08E-02	
	Weight uranium leached (g):	1.16E-03	4.34E-05	1.20E-03
	Uncertainty in weight uranium leached (g):	1.16E-04	4.35E-06	1.16E-04
	Effective number of exposed kernels:	2.9	0.1	3.0
	Uncertainty in effective number of exposed kernels:	0.3	0.0	0.3
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.00E-02	< 4.00E-02	Fe
	Uncorrected weight of impurity in sample (µg):	< 5.84	< 5.64	<11.48
	Weight of impurity in blank (µg):	< 6.76	< 5.44	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.84	5.64	11.48
Cr	Measured concentration of impurity in sample (µg/ml):	9.68E-03	1.21E-02	Cr
	Uncorrected weight of impurity in sample (µg):	1.41	1.71	3.12
	Weight of impurity in blank (µg):	< 0.85	< 0.68	
	Minimum corrected weight of impurity in sample (µg):	0.57	1.03	1.59
	Maximum corrected weight of impurity in sample (µg):	1.41	1.71	3.12
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	Mn
	Uncorrected weight of impurity in sample (µg):	< 1.46	< 1.41	< 2.87
	Weight of impurity in blank (µg):	< 1.69	< 1.36	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.46	1.41	2.87
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	< 1.17
	Weight of impurity in blank (µg):	< 0.69	< 0.55	
	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	1.17
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	Ni
	Uncorrected weight of impurity in sample (µg):	< 2.92	< 2.82	< 5.74
	Weight of impurity in blank (µg):	< 3.38	< 2.72	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.92	2.82	5.74
Ca	Measured concentration of impurity in sample (µg/ml):	1.05E+00	2.45E+00	Ca
	Uncorrected weight of impurity in sample (µg):	153.30	345.45	498.75
	Weight of impurity in blank (µg):	54.76	<13.60	
	Minimum corrected weight of impurity in sample (µg):	98.54	331.85	430.39
	Maximum corrected weight of impurity in sample (µg):	98.54	345.45	443.99
Al	Measured concentration of impurity in sample (µg/ml):	4.54E-01	7.86E-02	Al
	Uncorrected weight of impurity in sample (µg):	66.28	11.08	77.37
	Weight of impurity in blank (µg):	< 3.38	21.22	
	Minimum corrected weight of impurity in sample (µg):	62.90	0.00	62.90
	Maximum corrected weight of impurity in sample (µg):	66.28	0.00	66.28
Ti	Measured concentration of impurity in sample (µg/ml):	5.57E-02	6.44E-02	Ti
	Uncorrected weight of impurity in sample (µg):	8.13	9.08	17.21
	Weight of impurity in blank (µg):	< 3.38	< 2.72	
	Minimum corrected weight of impurity in sample (µg):	4.75	6.36	11.11
	Maximum corrected weight of impurity in sample (µg):	8.13	9.08	17.21
V	Measured concentration of impurity in sample (µg/ml):	2.09E-01	6.47E-02	V
	Uncorrected weight of impurity in sample (µg):	30.51	9.12	39.64
	Weight of impurity in blank (µg):	< 0.85	< 0.68	
	Minimum corrected weight of impurity in sample (µg):	29.67	8.44	38.11
	Maximum corrected weight of impurity in sample (µg):	30.51	9.12	39.64

Comments

Checked against official results of analyses for RMAL1807 by FCM on 5/01/209

Fred C. Montgomery — Operator

7-30-09 — 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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	122, 013, 099, 037, 051
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
Deconsolidation-leach solution ID:		L09032602	L09033102	
Number of compacts:		5		
Total volume of leach solution (ml):		148.0	143.0	
Radiochemical laboratory analysis number:		1807-010	1807-015	
Measured uranium concentration (µg/ml):		4.68E+00	1.57E-01	
Uncertainty in uranium concentration (µg/ml):		4.68E-01	1.57E-02	
Weight uranium leached (g):		6.93E-04	2.25E-05	7.15E-04
Uncertainty in weight uranium leached (g):		6.93E-05	2.25E-06	6.94E-05
Effective number of exposed kernels:		1.8	0.1	1.8
Uncertainty in effective number of exposed kernels:		0.2	0.0	0.2
Fe	Measured concentration of impurity in sample (µg/ml):	< 4.00E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	< 5.92	< 5.72	<11.64
	Weight of impurity in blank (µg):	< 6.76	< 5.44	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.92	5.72	11.64
Cr	Measured concentration of impurity in sample (µg/ml):	2.00E-02	7.55E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	2.96	1.08	4.04
	Weight of impurity in blank (µg):	< 0.85	< 0.68	
	Minimum corrected weight of impurity in sample (µg):	2.12	0.40	2.51
	Maximum corrected weight of impurity in sample (µg):	2.96	1.08	4.04
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 1.48	< 1.43	< 2.91
	Weight of impurity in blank (µg):	< 1.69	< 1.36	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.48	1.43	2.91
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	< 0.58	< 1.18
	Weight of impurity in blank (µg):	< 0.69	< 0.55	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.60	0.58	1.18
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	< 2.86	< 5.82
	Weight of impurity in blank (µg):	< 3.38	< 2.72	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.96	2.86	5.82
Ca	Measured concentration of impurity in sample (µg/ml):	1.32E+00	6.90E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	195.36	98.67	294.03
	Weight of impurity in blank (µg):	54.76	<13.60	
	Minimum corrected weight of impurity in sample (µg):	140.60	85.07	225.67
	Maximum corrected weight of impurity in sample (µg):	140.60	98.67	239.27
Al	Measured concentration of impurity in sample (µg/ml):	6.57E-01	5.24E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	97.24	7.49	104.73
	Weight of impurity in blank (µg):	< 3.38	21.22	
	Minimum corrected weight of impurity in sample (µg):	93.86	0.00	93.86
	Maximum corrected weight of impurity in sample (µg):	97.24	0.00	97.24
Ti	Measured concentration of impurity in sample (µg/ml):	1.46E-01	7.89E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	21.61	11.28	32.89
	Weight of impurity in blank (µg):	< 3.38	< 2.72	
	Minimum corrected weight of impurity in sample (µg):	18.23	8.56	26.79
	Maximum corrected weight of impurity in sample (µg):	21.61	11.28	32.89
V	Measured concentration of impurity in sample (µg/ml):	2.89E-01	4.54E-02	**V**
	Uncorrected weight of impurity in sample (µg):	42.77	6.49	49.26
	Weight of impurity in blank (µg):	< 0.85	< 0.68	
	Minimum corrected weight of impurity in sample (µg):	41.93	5.81	47.74
	Maximum corrected weight of impurity in sample (µg):	42.77	6.49	49.26

Comments

Checked against official results of analyses for RMAL1807 by FCM on 5/01/209

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	070, 126, 057, 069, 098
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09032603	L09033103	
	Number of compacts:	5		
	Total volume of leach solution (ml):	146.0	141.0	
	Radiochemical laboratory analysis number:	1807-011	1807-016	
	Measured uranium concentration (µg/ml):	1.37E-02	1.56E-03	
	Uncertainty in uranium concentration (µg/ml):	1.37E-03	1.56E-04	
	Weight uranium leached (g):	2.00E-06	2.20E-07	2.22E-06
	Uncertainty in weight uranium leached (g):	2.00E-07	2.20E-08	2.01E-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):	< 4.00E-02	< 4.00E-02	Fe
	Uncorrected weight of impurity in sample (µg):	< 5.84	< 5.64	<11.48
	Weight of impurity in blank (µg):	< 6.76	< 5.44	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.84	5.64	11.48
Cr	Measured concentration of impurity in sample (µg/ml):	1.21E-02	1.06E-02	Cr
	Uncorrected weight of impurity in sample (µg):	1.77	1.49	3.26
	Weight of impurity in blank (µg):	< 0.85	< 0.68	
	Minimum corrected weight of impurity in sample (µg):	0.92	0.81	1.74
	Maximum corrected weight of impurity in sample (µg):	1.77	1.49	3.26
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	Mn
	Uncorrected weight of impurity in sample (µg):	< 1.46	< 1.41	< 2.87
	Weight of impurity in blank (µg):	< 1.69	< 1.36	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.46	1.41	2.87
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	< 1.17
	Weight of impurity in blank (µg):	< 0.69	< 0.55	
	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	1.17
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	Ni
	Uncorrected weight of impurity in sample (µg):	< 2.92	< 2.82	< 5.74
	Weight of impurity in blank (µg):	< 3.38	< 2.72	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.92	2.82	5.74
Ca	Measured concentration of impurity in sample (µg/ml):	2.32E+00	3.53E+00	Ca
	Uncorrected weight of impurity in sample (µg):	338.72	497.73	836.45
	Weight of impurity in blank (µg):	54.76	<13.60	
	Minimum corrected weight of impurity in sample (µg):	283.96	484.13	768.09
	Maximum corrected weight of impurity in sample (µg):	283.96	497.73	781.69
Al	Measured concentration of impurity in sample (µg/ml):	5.04E-01	5.85E-02	Al
	Uncorrected weight of impurity in sample (µg):	73.58	8.25	81.83
	Weight of impurity in blank (µg):	< 3.38	21.22	
	Minimum corrected weight of impurity in sample (µg):	70.20	0.00	70.20
	Maximum corrected weight of impurity in sample (µg):	73.58	0.00	73.58
Ti	Measured concentration of impurity in sample (µg/ml):	9.52E-02	9.41E-02	Ti
	Uncorrected weight of impurity in sample (µg):	13.90	13.27	27.17
	Weight of impurity in blank (µg):	< 3.38	< 2.72	
	Minimum corrected weight of impurity in sample (µg):	10.52	10.55	21.07
	Maximum corrected weight of impurity in sample (µg):	13.90	13.27	27.17
V	Measured concentration of impurity in sample (µg/ml):	2.53E-01	5.63E-02	V
	Uncorrected weight of impurity in sample (µg):	36.94	7.94	44.88
	Weight of impurity in blank (µg):	< 0.85	< 0.68	
	Minimum corrected weight of impurity in sample (µg):	36.09	7.26	43.35
	Maximum corrected weight of impurity in sample (µg):	36.94	7.94	44.88

Comments

Checked against official results of analyses for RMAL1807 by FCM on 5/01/209

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	059, 014, 062, 073, 040
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09032604	L09033104	
	Number of compacts:	5		
	Total volume of leach solution (ml):	148.0	142.0	
	Radiochemical laboratory analysis number:	1807-012	1807-017	
	Measured uranium concentration (µg/ml):	2.48E+00	1.36E-01	
	Uncertainty in uranium concentration (µg/ml):	2.48E-01	1.36E-02	
	Weight uranium leached (g):	3.67E-04	1.93E-05	3.86E-04
	Uncertainty in weight uranium leached (g):	3.67E-05	1.93E-06	3.68E-05
	Effective number of exposed kernels:	0.9	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):	< 4.00E-02	< 4.00E-02	Fe
	Uncorrected weight of impurity in sample (µg):	< 5.92	< 5.68	<11.60
	Weight of impurity in blank (µg):	< 6.76	< 5.44	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	5.92	5.68	11.60
Cr	Measured concentration of impurity in sample (µg/ml):	1.03E-02	9.48E-03	Cr
	Uncorrected weight of impurity in sample (µg):	1.52	1.35	2.87
	Weight of impurity in blank (µg):	< 0.85	< 0.68	
	Minimum corrected weight of impurity in sample (µg):	0.68	0.67	1.35
	Maximum corrected weight of impurity in sample (µg):	1.52	1.35	2.87
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	Mn
	Uncorrected weight of impurity in sample (µg):	< 1.48	< 1.42	< 2.90
	Weight of impurity in blank (µg):	< 1.69	< 1.36	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.48	1.42	2.90
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	< 0.58	< 1.18
	Weight of impurity in blank (µg):	< 0.69	< 0.55	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.60	0.58	1.18
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	< 2.84	< 5.80
	Weight of impurity in blank (µg):	< 3.38	< 2.72	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	2.96	2.84	5.80
Ca	Measured concentration of impurity in sample (µg/ml):	8.98E-01	8.34E-01	Ca
	Uncorrected weight of impurity in sample (µg):	132.90	118.43	251.33
	Weight of impurity in blank (µg):	54.76	<13.60	
	Minimum corrected weight of impurity in sample (µg):	78.15	104.83	182.98
	Maximum corrected weight of impurity in sample (µg):	78.15	118.43	196.58
Al	Measured concentration of impurity in sample (µg/ml):	4.65E-01	5.45E-02	Al
	Uncorrected weight of impurity in sample (µg):	68.82	7.74	76.56
	Weight of impurity in blank (µg):	< 3.38	21.22	
	Minimum corrected weight of impurity in sample (µg):	65.44	0.00	65.44
	Maximum corrected weight of impurity in sample (µg):	68.82	0.00	68.82
Ti	Measured concentration of impurity in sample (µg/ml):	7.54E-02	7.45E-02	Ti
	Uncorrected weight of impurity in sample (µg):	11.16	10.58	21.74
	Weight of impurity in blank (µg):	< 3.38	< 2.72	
	Minimum corrected weight of impurity in sample (µg):	7.78	7.86	15.64
	Maximum corrected weight of impurity in sample (µg):	11.16	10.58	21.74
V	Measured concentration of impurity in sample (µg/ml):	2.55E-01	6.03E-03	V
	Uncorrected weight of impurity in sample (µg):	37.74	0.86	38.60
	Weight of impurity in blank (µg):	< 0.85	< 0.68	
	Minimum corrected weight of impurity in sample (µg):	36.90	0.18	37.07
	Maximum corrected weight of impurity in sample (µg):	37.74	0.86	38.60

Comments

Checked against official results of analyses for RMAL1807 by FCM on 5/01/209

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	Deconsolidation Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09032605	L09033105	
	Number of compacts:	None		
	Total volume of leach solution (ml):	169.0	136.0	
	Radiochemical laboratory analysis number:	1807-013	1807-018	
	Measured uranium concentration (µg/ml):	<5.00E-04	<5.00E-04	
	Uncertainty in uranium concentration (µg/ml):			
	Weight uranium leached (g):	<8.45E-08	<6.80E-08	<1.53E-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):	< 4.00E-02	< 4.00E-02	Fe
	Total weight of leached impurity (µg):	< 6.76	< 5.44	<12.20
Cr	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.85	< 0.68	< 1.53
Mn	Measured concentration (µg/ml):	< 1.00E-02	< 1.00E-02	Mn
	Total weight of leached impurity (µg):	< 1.69	< 1.36	< 3.05
Co	Measured concentration (µg/ml):	< 4.06E-03	< 4.06E-03	Co
	Total weight of leached impurity (µg):	< 0.69	< 0.55	< 1.24
Ni	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ni
	Total weight of leached impurity (µg):	< 3.38	< 2.72	< 6.10
Ca	Measured concentration (µg/ml):	3.24E-01	< 1.00E-01	Ca
	Total weight of leached impurity (µg):	54.76	<13.60	<68.36
Al	Measured concentration (µg/ml):	< 2.00E-02	1.56E-01	Al
	Total weight of leached impurity (µg):	< 3.38	21.22	<24.60
Ti	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ti
	Total weight of leached impurity (µg):	< 3.38	< 2.72	< 6.10
V	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	V
	Total weight of leached impurity (µg):	< 0.85	< 0.68	< 1.53

Comments

Checked against official results of analyses for RMAL1807 by FCM on 5/01/209

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	129, 032, 083, 035, 018
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040701	B09040901	
	Number of compacts:	5		
	Total volume of leach solution (ml):	52.0	52.0	
	Radiochemical laboratory analysis number:	1832-007	1832-012	
	Measured uranium concentration (µg/ml):	1.62E-01	8.40E-04	
	Uncertainty in uranium concentration (µg/ml):	1.62E-02	8.40E-05	
	Weight uranium leached (g):	8.42E-06	4.37E-08	8.47E-06
	Uncertainty in weight uranium leached (g):	8.49E-07	4.40E-09	8.49E-07
	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):	7.18E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.73	< 2.08	< 5.81
	Weight of impurity in blank (µg):	< 2.10	< 2.04	
	Minimum corrected weight of impurity in sample (µg):	1.63	0.00	1.63
	Maximum corrected weight of impurity in sample (µg):	3.73	2.08	5.81
Cr	Measured concentration of impurity in sample (µg/ml):	1.15E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.60	< 0.26	< 0.86
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.34	0.00	0.34
	Maximum corrected weight of impurity in sample (µg):	0.60	0.26	0.86
Mn	Measured concentration of impurity in sample (µg/ml):	2.35E-01	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	12.22	< 0.52	<12.74
	Weight of impurity in blank (µg):	< 0.53	< 0.51	
	Minimum corrected weight of impurity in sample (µg):	11.70	0.00	11.70
	Maximum corrected weight of impurity in sample (µg):	12.22	0.52	12.74
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.21	< 0.21	< 0.42
	Weight of impurity in blank (µg):	< 0.21	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.21	0.21	0.42
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.04	< 1.04	< 2.08
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.04	1.04	2.08
Ca	Measured concentration of impurity in sample (µg/ml):	2.04E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	106.08	< 5.20	<111.28
	Weight of impurity in blank (µg):	< 5.25	< 5.10	
	Minimum corrected weight of impurity in sample (µg):	100.83	0.00	100.83
	Maximum corrected weight of impurity in sample (µg):	106.08	5.20	111.28
Al	Measured concentration of impurity in sample (µg/ml):	1.33E+00	2.78E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	69.16	1.45	70.61
	Weight of impurity in blank (µg):	4.50	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	64.66	0.43	65.09
	Maximum corrected weight of impurity in sample (µg):	64.66	1.45	66.11
Ti	Measured concentration of impurity in sample (µg/ml):	5.51E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	28.65	< 1.04	<29.69
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	27.60	0.00	27.60
	Maximum corrected weight of impurity in sample (µg):	28.65	1.04	29.69
V	Measured concentration of impurity in sample (µg/ml):	1.15E+00	< 5.00E-03	**V**
	Uncorrected weight of impurity in sample (µg):	59.80	< 0.26	<60.06
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	59.54	0.00	59.54
	Maximum corrected weight of impurity in sample (µg):	59.80	0.26	60.06

Comments

Checked by FCM on 7/29/2009 against the official results of analyses for RMAL1832

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	122, 013, 099, 037, 051
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040702	B09040902	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.0	52.0	
	Radiochemical laboratory analysis number:	1832-008	1832-013	
	Measured uranium concentration (µg/ml):	1.18E-01	8.20E-04	
	Uncertainty in uranium concentration (µg/ml):	1.18E-02	8.20E-05	
	Weight uranium leached (g):	5.78E-06	4.26E-08	5.82E-06
	Uncertainty in weight uranium leached (g):	5.83E-07	4.30E-09	5.83E-07
	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):	6.74E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.30	< 2.08	< 5.38
	Weight of impurity in blank (µg):	< 2.10	< 2.04	
	Minimum corrected weight of impurity in sample (µg):	1.20	0.00	1.20
	Maximum corrected weight of impurity in sample (µg):	3.30	2.08	5.38
Cr	Measured concentration of impurity in sample (µg/ml):	1.23E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.60	< 0.26	< 0.86
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.34	0.00	0.34
	Maximum corrected weight of impurity in sample (µg):	0.60	0.26	0.86
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.49	< 0.52	< 1.01
	Weight of impurity in blank (µg):	< 0.53	< 0.51	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.49	0.52	1.01
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.20	< 0.21	< 0.41
	Weight of impurity in blank (µg):	< 0.21	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.20	0.21	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 0.98	< 1.04	< 2.02
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.98	1.04	2.02
Ca	Measured concentration of impurity in sample (µg/ml):	2.86E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	140.14	< 5.20	<145.34
	Weight of impurity in blank (µg):	< 5.25	< 5.10	
	Minimum corrected weight of impurity in sample (µg):	134.89	0.00	134.89
	Maximum corrected weight of impurity in sample (µg):	140.14	5.20	145.34
Al	Measured concentration of impurity in sample (µg/ml):	1.33E+00	3.26E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	65.17	1.70	66.87
	Weight of impurity in blank (µg):	4.50	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	60.67	0.68	61.35
	Maximum corrected weight of impurity in sample (µg):	60.67	1.70	62.37
Ti	Measured concentration of impurity in sample (µg/ml):	4.14E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	20.29	< 1.04	<21.33
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	19.24	0.00	19.24
	Maximum corrected weight of impurity in sample (µg):	20.29	1.04	21.33
V	Measured concentration of impurity in sample (µg/ml):	1.22E+00	5.37E-03	**V**
	Uncorrected weight of impurity in sample (µg):	59.78	0.28	60.06
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	59.52	0.02	59.54
	Maximum corrected weight of impurity in sample (µg):	59.78	0.28	60.06

Comments

Checked by FCM on 7/29/2009 against the official results of analyses for RMAL1832

Fred C. Montgomery — Operator

7-30-09 — 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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	070, 126, 057, 069, 098
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040703	B09040903	
	Number of compacts:	5		
	Total volume of leach solution (ml):	50.5	50.5	
	Radiochemical laboratory analysis number:	1832-009	1832-014	
	Measured uranium concentration (µg/ml):	7.10E-02	6.90E-04	
	Uncertainty in uranium concentration (µg/ml):	7.10E-03	6.90E-05	
	Weight uranium leached (g):	3.59E-06	3.48E-08	3.62E-06
	Uncertainty in weight uranium leached (g):	3.62E-07	3.51E-09	3.62E-07
	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):	6.33E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.20	< 2.02	< 5.22
	Weight of impurity in blank (µg):	< 2.10	< 2.04	
	Minimum corrected weight of impurity in sample (µg):	1.10	0.00	1.10
	Maximum corrected weight of impurity in sample (µg):	3.20	2.02	5.22
Cr	Measured concentration of impurity in sample (µg/ml):	1.34E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.68	< 0.25	< 0.93
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.41	0.00	0.41
	Maximum corrected weight of impurity in sample (µg):	0.68	0.25	0.93
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.51	< 0.51	< 1.01
	Weight of impurity in blank (µg):	< 0.53	< 0.51	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.51	0.51	1.01
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.21	< 0.21	< 0.41
	Weight of impurity in blank (µg):	< 0.21	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.21	0.21	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.01	< 1.01	< 2.02
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.01	1.01	2.02
Ca	Measured concentration of impurity in sample (µg/ml):	2.12E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	107.06	< 5.05	<112.11
	Weight of impurity in blank (µg):	< 5.25	< 5.10	
	Minimum corrected weight of impurity in sample (µg):	101.81	0.00	101.81
	Maximum corrected weight of impurity in sample (µg):	107.06	5.05	112.11
Al	Measured concentration of impurity in sample (µg/ml):	1.36E+00	3.10E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	68.68	1.57	70.25
	Weight of impurity in blank (µg):	4.50	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	64.18	0.55	64.73
	Maximum corrected weight of impurity in sample (µg):	64.18	1.57	65.75
Ti	Measured concentration of impurity in sample (µg/ml):	4.79E-01	2.06E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	24.19	1.04	25.23
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	23.14	0.02	23.16
	Maximum corrected weight of impurity in sample (µg):	24.19	1.04	25.23
V	Measured concentration of impurity in sample (µg/ml):	1.17E+00	5.99E-03	**V**
	Uncorrected weight of impurity in sample (µg):	59.09	0.30	59.39
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	58.82	0.05	58.87
	Maximum corrected weight of impurity in sample (µg):	59.09	0.30	59.39

Comments

Checked by FCM on 7/29/2009 against the official resultis of analyses for RMAL1832

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	059, 014, 062, 073, 040
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040704	B09040904	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.0	51.0	
	Radiochemical laboratory analysis number:	1832-010	1832-015	
	Measured uranium concentration (µg/ml):	1.03E-01	8.60E-04	
	Uncertainty in uranium concentration (µg/ml):	1.03E-02	8.60E-05	
	Weight uranium leached (g):	5.05E-06	4.39E-08	5.09E-06
	Uncertainty in weight uranium leached (g):	5.09E-07	4.42E-09	5.09E-07
	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):	8.46E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	4.15	< 2.04	< 6.19
	Weight of impurity in blank (µg):	< 2.10	< 2.04	
	Minimum corrected weight of impurity in sample (µg):	2.05	0.00	2.05
	Maximum corrected weight of impurity in sample (µg):	4.15	2.04	6.19
Cr	Measured concentration of impurity in sample (µg/ml):	1.24E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.61	< 0.26	< 0.86
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.35	0.00	0.35
	Maximum corrected weight of impurity in sample (µg):	0.61	0.26	0.86
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.49	< 0.51	< 1.00
	Weight of impurity in blank (µg):	< 0.53	< 0.51	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.49	0.51	1.00
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.20	< 0.21	< 0.41
	Weight of impurity in blank (µg):	< 0.21	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.20	0.21	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 0.98	< 1.02	< 2.00
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.98	1.02	2.00
Ca	Measured concentration of impurity in sample (µg/ml):	1.79E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	87.71	< 5.10	<92.81
	Weight of impurity in blank (µg):	< 5.25	< 5.10	
	Minimum corrected weight of impurity in sample (µg):	82.46	0.00	82.46
	Maximum corrected weight of impurity in sample (µg):	87.71	5.10	92.81
Al	Measured concentration of impurity in sample (µg/ml):	1.36E+00	3.11E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	66.64	1.59	68.23
	Weight of impurity in blank (µg):	4.50	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	62.14	0.57	62.71
	Maximum corrected weight of impurity in sample (µg):	62.14	1.59	63.73
Ti	Measured concentration of impurity in sample (µg/ml):	5.49E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	26.90	< 1.02	<27.92
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	25.85	0.00	25.85
	Maximum corrected weight of impurity in sample (µg):	26.90	1.02	27.92
V	Measured concentration of impurity in sample (µg/ml):	1.25E+00	6.55E-03	**V**
	Uncorrected weight of impurity in sample (µg):	61.25	0.33	61.58
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	60.99	0.08	61.07
	Maximum corrected weight of impurity in sample (µg):	61.25	0.33	61.58

Comments

Checked by FCM on 7/29/2009 against the official resultls of analyses for RMAL1832

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	Burn-Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040705	B09040905	
	Number of compacts:	None		
	Total volume of leach solution (ml):	52.5	51.0	
	Radiochemical laboratory analysis number:	1832-011	1832-016	
	Measured uranium concentration (µg/ml):	9.96E-03	< 5.00E-04	
	Uncertainty in uranium concentration (µg/ml):	9.96E-04		
	Weight uranium leached (g):	5.23E-07	< 2.63E-08	5.49E-07
	Uncertainty in weight uranium leached (g):	5.27E-08		
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:	0.0		
Fe	Measured concentration (µg/ml):	< 4.00E-02	< 4.00E-02	Fe
	Total weight of leached impurity (µg):	< 2.10	< 2.04	< 4.14
Cr	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.26	< 0.26	< 0.52
Mn	Measured concentration (µg/ml):	< 1.00E-02	< 1.00E-02	Mn
	Total weight of leached impurity (µg):	< 0.53	< 0.51	< 1.04
Co	Measured concentration (µg/ml):	< 4.06E-03	< 4.60E-03	Co
	Total weight of leached impurity (µg):	< 0.21	< 0.23	< 0.45
Ni	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ni
	Total weight of leached impurity (µg):	< 1.05	< 1.02	< 2.07
Ca	Measured concentration (µg/ml):	< 1.00E-01	< 1.00E-01	Ca
	Total weight of leached impurity (µg):	< 5.25	< 5.10	<10.35
Al	Measured concentration (µg/ml):	8.57E-02	< 2.00E-02	Al
	Total weight of leached impurity (µg):	4.50	< 1.02	< 5.52
Ti	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	Ti
	Total weight of leached impurity (µg):	< 1.05	< 1.02	< 2.07
V	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	V
	Total weight of leached impurity (µg):	< 0.26	< 0.26	< 0.52

Comments

Checked by FCM on 7/29/2009 against the official resultls of analyses for RMAL1832

Fred C. Montgomery
Operator

7-30-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant fuel, from G73J-14-93074A
Compact ID number:	115
DRF filename:	\\mc-agr\AGR\DefectiveOPyC\LEU06-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 11 smaller diameter particles.
1 particle had a smooth glossy surface.
1 particle had a small crater in the surface that did not extend into the coating.

Fred C. Montgomery
Operator

6-3-09
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
Compact lot ID:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	047 108 027 074 120 058 024 131 111 023 016 005 094 031 001 089 003 063 078 015
DRF filename:	\\mc-agr\AGR\DefectiveIPyC\LEU06-OP1-Z_DRF28R2.xls

Number of compacts from which particles were recovered:	20

Weight of sample of particles (g):	54.945
Number of particles in sample:	63724
Mean average weight/particle (g):	8.62E-04

Number of particles with excessive U dispersion:	0

Comments

John Hunn — Operator

12-8-09 — 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.

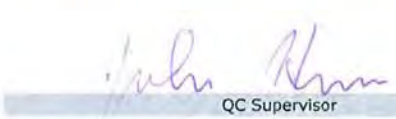
Re-analysis of leach solutions from the second set of 20 compacts

As mentioned above, the leach solutions from the second set of 20 compacts were re-analyzed due to an erroneously high calcium value in the first analysis. The inspection report forms and data sheets for the second analysis follow.

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:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	129, 032, 083, 035, 018	122, 013, 099, 037, 051	070, 126, 057, 069, 098	059, 014, 062, 073, 040	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Deconsolidation-leach (DRF-26A) (µg):	11.82	11.99	11.82	11.95		
Burn-leach (DRF-26B) (µg):	5.81	5.38	5.22	6.19		
Total leached (µg):	17.64	17.37	17.04	18.13		
Fe outside SiC (µg/compact):	**3.53**	**3.47**	**3.41**	**3.63**	**3.51**	**0.09**
Chromium						
Deconsolidation-leach (DRF-26A) (µg):	1.87	2.34	2.10	1.71		
Burn-leach (DRF-26B) (µg):	0.86	0.86	0.93	0.86		
Total leached (µg):	2.73	3.20	3.03	2.58		
Cr outside SiC (µg/compact):	**0.55**	**0.64**	**0.61**	**0.52**	**0.58**	**0.06**
Manganese						
Deconsolidation-leach (DRF-26A) (µg):	0.55	0.56	0.55	0.55		
Burn-leach (DRF-26B) (µg):	12.74	1.01	1.01	1.00		
Total leached (µg):	13.29	1.57	1.56	1.55		
Mn outside SiC (µg/compact):	**2.66**	**0.31**	**0.31**	**0.31**	**0.90**	**1.17**
Cobalt						
Deconsolidation-leach (DRF-26A) (µg):	0.46	0.47	0.46	0.47		
Burn-leach (DRF-26B) (µg):	0.42	0.41	0.41	0.41		
Total leached (µg):	0.89	0.88	0.88	0.88		
Co outside SiC (µg/compact):	**0.18**	**0.18**	**0.18**	**0.18**	**0.176**	**0.001**
Nickel						
Deconsolidation-leach (DRF-26A) (µg):	2.30	2.33	2.30	2.32		
Burn-leach (DRF-26B) (µg):	2.08	2.02	2.02	2.00		
Total leached (µg):	4.38	4.35	4.32	4.32		
Ni outside SiC (µg/compact):	**0.88**	**0.87**	**0.86**	**0.86**	**0.868**	**0.006**
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):	**4.26**	**2.00**	**1.96**	**1.87**	**2.52**	**1.16**
Calcium						
Deconsolidation-leach (DRF-26A) (µg):	83.08	67.02	22.34	4.56		
Burn-leach (DRF-26B) (µg):	111.28	145.34	112.11	92.81		
Total leached (µg):	194.36	212.36	134.45	97.37		
Ca outside SiC (µg/compact):	**38.87**	**42.47**	**26.89**	**19.47**	**31.93**	**10.64**
Aluminum						
Deconsolidation-leach (DRF-26A) (µg):	55.07	70.71	60.61	51.05		
Burn-leach (DRF-26B) (µg):	66.11	62.37	65.75	63.73		
Total leached (µg):	121.18	133.08	126.35	114.78		
Al outside SiC (µg/compact):	**24.24**	**26.62**	**25.27**	**22.96**	**24.77**	**1.55**
Titanium						
Deconsolidation-leach (DRF-26A) (µg):	15.55	27.19	24.59	18.83		
Burn-leach (DRF-26B) (µg):	29.69	21.33	25.23	27.92		
Total leached (µg):	45.24	48.51	49.82	46.76		
Ti outside SiC (µg/compact):	**9.05**	**9.70**	**9.96**	**9.35**	**9.52**	**0.40**
Vanadium						
Deconsolidation-leach (DRF-26A) (µg):	37.92	40.77	38.34	39.73		
Burn-leach (DRF-26B) (µg):	60.06	60.06	59.39	61.58		
Total leached (µg):	97.98	100.83	97.72	101.32		
V outside SiC (µg/compact):	**19.60**	**20.17**	**19.54**	**20.26**	**19.89**	**0.37**
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):	**28.64**	**29.87**	**29.51**	**29.61**	**29.41**	**0.53**



QC Supervisor

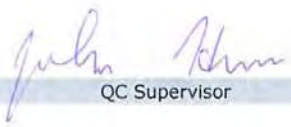
12-16-09

Date

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

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	129, 032, 083, 035, 018	122, 013, 099, 037, 051	070, 126, 057, 069, 098	059, 014, 062, 073, 040	Total
Number of compacts:	5	5	5	5	20
Effective number of exposed kernels:	2.9	1.8	0.0	0.9	5.5



QC Supervisor

12-16-09

Date

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

Procedure:	AGR-CHAR-PIP-12 Rev. 1
Operator:	Fred Montgomery
Compact lot ID:	LEU06-OP1-Z
Compact Lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A

Compact ID numbers:	129, 032, 083, 035, 018	122, 013, 099, 037, 051	070, 126, 057, 069, 098	059, 014, 062, 073, 040	Total
Number of compacts:	5	5	5	5	20
Number of leached kernels:	0	0	0	0	0

QC Supervisor

12-16-09
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	129, 032, 083, 035, 018
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09113005	L09113010	
	Number of compacts:	5		
	Total volume of leach solution (ml):	146.0	141.0	
	Radiochemical laboratory analysis number:	2419-020	2419-025	
	Measured uranium concentration (µg/ml):	7.43E+00	3.22E-01	
	Uncertainty in uranium concentration (µg/ml):	7.43E-01	3.22E-02	
	Weight uranium leached (g):	1.08E-03	4.54E-05	1.13E-03
	Uncertainty in weight uranium leached (g):	1.09E-04	4.55E-06	1.09E-04
	Effective number of exposed kernels:	2.7	0.1	2.9
	Uncertainty in effective number of exposed kernels:	0.3	0.0	0.3
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	< 5.81	<11.82
	Weight of impurity in blank (µg):	< 6.96	< 5.60	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.02	5.81	11.82
Cr	Measured concentration of impurity in sample (µg/ml):	6.85E-03	6.15E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.00	0.87	1.87
	Weight of impurity in blank (µg):	< 0.34	< 0.27	
	Minimum corrected weight of impurity in sample (µg):	0.66	0.60	1.26
	Maximum corrected weight of impurity in sample (µg):	1.00	0.87	1.87
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	< 0.27	< 0.55
	Weight of impurity in blank (µg):	< 0.32	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.27	0.55
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	< 0.23	< 0.46
	Weight of impurity in blank (µg):	< 0.27	< 0.22	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.23	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):	< 1.17	< 1.13	< 2.30
	Weight of impurity in blank (µg):	< 1.35	< 1.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.17	1.13	2.30
Ca	Measured concentration of impurity in sample (µg/ml):	7.01E-01	9.60E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	102.35	135.36	237.71
	Weight of impurity in blank (µg):	19.27	195.84	
	Minimum corrected weight of impurity in sample (µg):	83.08	0.00	83.08
	Maximum corrected weight of impurity in sample (µg):	83.08	0.00	83.08
Al	Measured concentration of impurity in sample (µg/ml):	3.73E-01	9.97E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	54.46	14.06	68.52
	Weight of impurity in blank (µg):	8.89	4.56	
	Minimum corrected weight of impurity in sample (µg):	45.57	9.50	55.07
	Maximum corrected weight of impurity in sample (µg):	45.57	9.50	55.07
Ti	Measured concentration of impurity in sample (µg/ml):	5.34E-02	5.50E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	7.80	7.76	15.55
	Weight of impurity in blank (µg):	< 1.35	< 1.09	
	Minimum corrected weight of impurity in sample (µg):	6.44	6.67	13.11
	Maximum corrected weight of impurity in sample (µg):	7.80	7.76	15.55
V	Measured concentration of impurity in sample (µg/ml):	2.09E-01	5.25E-02	**V**
	Uncorrected weight of impurity in sample (µg):	30.51	7.40	37.92
	Weight of impurity in blank (µg):	< 0.34	< 0.27	
	Minimum corrected weight of impurity in sample (µg):	30.18	7.13	37.31
	Maximum corrected weight of impurity in sample (µg):	30.51	7.40	37.92

Comments

Historical samples of the original preburn leach solutions were reanalyzed on 11/30/2009 because of high measured Ca concentration in initial analyses.
Checked against official results of analyses for RMAL 1807 by FCM on 5/01/209.
Checked against official results of analyses for RMAL 2419 by FCM on 12/07/2009.

Fred C. Montgomery — Operator

12-15-2009 — 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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	122, 013, 099, 037, 051
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09113006	L09113011	
	Number of compacts:	5		
	Total volume of leach solution (ml):	148.0	143.0	
	Radiochemical laboratory analysis number:	2419-021	2419-026	
	Measured uranium concentration (µg/ml):	4.58E+00	1.70E-01	
	Uncertainty in uranium concentration (µg/ml):	4.58E-01	1.70E-02	
	Weight uranium leached (g):	6.78E-04	2.43E-05	7.02E-04
	Uncertainty in weight uranium leached (g):	6.78E-05	2.43E-06	6.79E-05
	Effective number of exposed kernels:	1.7	0.1	1.8
	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):	< 6.10	< 5.89	<11.99
	Weight of impurity in blank (µg):	< 6.96	< 5.60	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.10	5.89	11.99
Cr	Measured concentration of impurity in sample (µg/ml):	1.15E-02	4.45E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.70	0.64	2.34
	Weight of impurity in blank (µg):	< 0.34	< 0.27	
	Minimum corrected weight of impurity in sample (µg):	1.36	0.36	1.73
	Maximum corrected weight of impurity in sample (µg):	1.70	0.64	2.34
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	< 0.27	< 0.56
	Weight of impurity in blank (µg):	< 0.32	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.27	0.56
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	< 0.23	< 0.47
	Weight of impurity in blank (µg):	< 0.27	< 0.22	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.23	0.47
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.18	< 1.14	< 2.33
	Weight of impurity in blank (µg):	< 1.35	< 1.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.18	1.14	2.33
Ca	Measured concentration of impurity in sample (µg/ml):	5.83E-01	3.59E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	86.28	51.34	137.62
	Weight of impurity in blank (µg):	19.27	195.84	
	Minimum corrected weight of impurity in sample (µg):	67.02	0.00	67.02
	Maximum corrected weight of impurity in sample (µg):	67.02	0.00	67.02
Al	Measured concentration of impurity in sample (µg/ml):	4.72E-01	1.00E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	69.86	14.30	84.16
	Weight of impurity in blank (µg):	8.89	4.56	
	Minimum corrected weight of impurity in sample (µg):	60.97	9.74	70.71
	Maximum corrected weight of impurity in sample (µg):	60.97	9.74	70.71
Ti	Measured concentration of impurity in sample (µg/ml):	1.18E-01	6.80E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	17.46	9.72	27.19
	Weight of impurity in blank (µg):	< 1.35	< 1.09	
	Minimum corrected weight of impurity in sample (µg):	16.11	8.64	24.75
	Maximum corrected weight of impurity in sample (µg):	17.46	9.72	27.19
V	Measured concentration of impurity in sample (µg/ml):	2.37E-01	3.98E-02	**V**
	Uncorrected weight of impurity in sample (µg):	35.08	5.69	40.77
	Weight of impurity in blank (µg):	< 0.34	< 0.27	
	Minimum corrected weight of impurity in sample (µg):	34.74	5.42	40.16
	Maximum corrected weight of impurity in sample (µg):	35.08	5.69	40.77

Comments

Historical samples of the original preburn leach solutions were reanalyzed on 11/30/2009 because of high measured Ca concentration in initial analyses.
Checked against official results of analyses for RMAL 1807 by FCM on 5/01/209.
Checked against official results of analyses for RMAL 2419 by FCM on 12/07/2009.

Fred C. Montgomery
Operator

12-15-2009
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	070, 126, 057, 069, 098
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09113007	L09113012	
	Number of compacts:	5		
	Total volume of leach solution (ml):	146.0	141.0	
	Radiochemical laboratory analysis number:	2419-022	2419-027	
	Measured uranium concentration (µg/ml):	1.60E-02	2.69E-03	
	Uncertainty in uranium concentration (µg/ml):	1.60E-03	2.69E-04	
	Weight uranium leached (g):	2.34E-06	3.79E-07	2.72E-06
	Uncertainty in weight uranium leached (g):	2.34E-07	3.80E-08	2.37E-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	< 5.81	<11.82
	Weight of impurity in blank (µg):	< 6.96	< 5.60	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.02	5.81	11.82
Cr	Measured concentration of impurity in sample (µg/ml):	7.89E-03	6.71E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	1.15	0.95	2.10
	Weight of impurity in blank (µg):	< 0.34	< 0.27	
	Minimum corrected weight of impurity in sample (µg):	0.81	0.67	1.49
	Maximum corrected weight of impurity in sample (µg):	1.15	0.95	2.10
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	< 0.27	< 0.55
	Weight of impurity in blank (µg):	< 0.32	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.27	0.55
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	< 0.23	< 0.46
	Weight of impurity in blank (µg):	< 0.27	< 0.22	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.23	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):	< 1.17	< 1.13	< 2.30
	Weight of impurity in blank (µg):	< 1.35	< 1.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.17	1.13	2.30
Ca	Measured concentration of impurity in sample (µg/ml):	2.85E-01	3.04E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	41.61	42.86	84.47
	Weight of impurity in blank (µg):	19.27	195.84	
	Minimum corrected weight of impurity in sample (µg):	22.34	0.00	22.34
	Maximum corrected weight of impurity in sample (µg):	22.34	0.00	22.34
Al	Measured concentration of impurity in sample (µg/ml):	4.00E-01	1.11E-01	**Al**
	Uncorrected weight of impurity in sample (µg):	58.40	15.65	74.05
	Weight of impurity in blank (µg):	8.89	4.56	
	Minimum corrected weight of impurity in sample (µg):	49.51	11.10	60.61
	Maximum corrected weight of impurity in sample (µg):	49.51	11.10	60.61
Ti	Measured concentration of impurity in sample (µg/ml):	8.65E-02	8.48E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	12.63	11.96	24.59
	Weight of impurity in blank (µg):	< 1.35	< 1.09	
	Minimum corrected weight of impurity in sample (µg):	11.28	10.87	22.15
	Maximum corrected weight of impurity in sample (µg):	12.63	11.96	24.59
V	Measured concentration of impurity in sample (µg/ml):	2.11E-01	5.34E-02	**V**
	Uncorrected weight of impurity in sample (µg):	30.81	7.53	38.34
	Weight of impurity in blank (µg):	< 0.34	< 0.27	
	Minimum corrected weight of impurity in sample (µg):	30.47	7.26	37.73
	Maximum corrected weight of impurity in sample (µg):	30.81	7.53	38.34

Comments

Historical samples of the original preburn leach solutions were reanalyzed on 11/30/2009 because of high measured Ca concentration in initial analyses.
Checked against official results of analyses for RMAL 1807 by FCM on 5/01/209.
Checked against official results of analyses for RMAL 2419 by FCM on 12/07/2009.

Fred C. Montgomery
Operator

12-15-2009
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	059, 014, 062, 073, 040
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09113008	L09113013	
	Number of compacts:	5		
	Total volume of leach solution (ml):	148.0	142.0	
	Radiochemical laboratory analysis number:	2419-023	2419-028	
	Measured uranium concentration (µg/ml):	2.19E+00	1.45E-01	
	Uncertainty in uranium concentration (µg/ml):	2.19E-01	1.45E-02	
	Weight uranium leached (g):	3.24E-04	2.06E-05	3.45E-04
	Uncertainty in weight uranium leached (g):	3.24E-05	2.06E-06	3.25E-05
	Effective number of exposed kernels:	0.8	0.1	0.9
	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):	< 6.10	< 5.85	<11.95
	Weight of impurity in blank (µg):	< 6.96	< 5.60	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	6.10	5.85	11.95
Cr	Measured concentration of impurity in sample (µg/ml):	6.54E-03	5.26E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.97	0.75	1.71
	Weight of impurity in blank (µg):	< 0.34	< 0.27	
	Minimum corrected weight of impurity in sample (µg):	0.63	0.47	1.10
	Maximum corrected weight of impurity in sample (µg):	0.97	0.75	1.71
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.91E-03	< 1.91E-03	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.28	< 0.27	< 0.55
	Weight of impurity in blank (µg):	< 0.32	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.28	0.27	0.55
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	< 0.23	< 0.47
	Weight of impurity in blank (µg):	< 0.27	< 0.22	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.24	0.23	0.47
Ni	Measured concentration of impurity in sample (µg/ml):	< 8.00E-03	< 8.00E-03	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.18	< 1.14	< 2.32
	Weight of impurity in blank (µg):	< 1.35	< 1.09	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.18	1.14	2.32
Ca	Measured concentration of impurity in sample (µg/ml):	1.61E-01	3.07E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	23.83	43.59	67.42
	Weight of impurity in blank (µg):	19.27	195.84	
	Minimum corrected weight of impurity in sample (µg):	4.56	0.00	4.56
	Maximum corrected weight of impurity in sample (µg):	4.56	0.00	4.56
Al	Measured concentration of impurity in sample (µg/ml):	3.58E-01	8.11E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	52.98	11.52	64.50
	Weight of impurity in blank (µg):	8.89	4.56	
	Minimum corrected weight of impurity in sample (µg):	44.09	6.96	51.05
	Maximum corrected weight of impurity in sample (µg):	44.09	6.96	51.05
Ti	Measured concentration of impurity in sample (µg/ml):	6.72E-02	6.26E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	9.95	8.89	18.83
	Weight of impurity in blank (µg):	< 1.35	< 1.09	
	Minimum corrected weight of impurity in sample (µg):	8.59	7.80	16.39
	Maximum corrected weight of impurity in sample (µg):	9.95	8.89	18.83
V	Measured concentration of impurity in sample (µg/ml):	2.18E-01	5.26E-02	**V**
	Uncorrected weight of impurity in sample (µg):	32.26	7.47	39.73
	Weight of impurity in blank (µg):	< 0.34	< 0.27	
	Minimum corrected weight of impurity in sample (µg):	31.93	7.20	39.12
	Maximum corrected weight of impurity in sample (µg):	32.26	7.47	39.73

Comments

Historical samples of the original preburn leach solutions were reanalyzed on 11/30/2009 because of high measured Ca concentration in initial analyses.
Checked against official results of analyses for RMAL 1807 by FCM on 5/01/209.
Checked against official results of analyses for RMAL 2419 by FCM on 12/07/2009.

Fred C. Montgomery
Operator

12-15-2009
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	Deconsolidation Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Deconsolidation-leach solution ID:	L09113009	L09113014	
	Number of compacts:	None		
	Total volume of leach solution (ml):	169.0	136.0	
	Radiochemical laboratory analysis number:	2419-024	2419-029	
	Measured uranium concentration (µg/ml):	5.32E-04	<2.00E-04	
	Uncertainty in uranium concentration (µg/ml):	5.32E-05		
	Weight uranium leached (g):	8.99E-08	<2.72E-08	<1.17E-07
	Uncertainty in weight uranium leached (g):	9.00E-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):	< 6.96	< 5.60	<12.57
Cr	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	Cr
	Total weight of leached impurity (µg):	< 0.34	< 0.27	< 0.61
Mn	Measured concentration (µg/ml):	< 1.91E-03	< 1.91E-03	Mn
	Total weight of leached impurity (µg):	< 0.32	< 0.26	< 0.58
Co	Measured concentration (µg/ml):	< 1.62E-03	< 1.62E-03	Co
	Total weight of leached impurity (µg):	< 0.27	< 0.22	< 0.49
Ni	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ni
	Total weight of leached impurity (µg):	< 1.35	< 1.09	< 2.44
Ca	Measured concentration (µg/ml):	1.14E-01	1.44E+00	Ca
	Total weight of leached impurity (µg):	19.27	195.84	215.11
Al	Measured concentration (µg/ml):	5.26E-02	3.35E-02	Al
	Total weight of leached impurity (µg):	8.89	4.56	13.45
Ti	Measured concentration (µg/ml):	< 8.00E-03	< 8.00E-03	Ti
	Total weight of leached impurity (µg):	< 1.35	< 1.09	< 2.44
V	Measured concentration (µg/ml):	< 2.00E-03	< 2.00E-03	V
	Total weight of leached impurity (µg):	< 0.34	< 0.27	< 0.61

Comments

Historical samples of the original preburn leach solutions were reanalyzed on 11/30/2009 because of high measured Ca concentration in initial analyses.
Checked against official results of analyses for RMAL 1807 by FCM on 5/01/209.
Checked against official results of analyses for RMAL 2419 by FCM on 12/07/2009.

Fred C. Montgomery
Operator

12-15-2009
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	129, 032, 083, 035, 018
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040701	B09040901	
	Number of compacts:	5		
	Total volume of leach solution (ml):	52.0	52.0	
	Radiochemical laboratory analysis number:	1832-007	1832-012	
	Measured uranium concentration (µg/ml):	1.62E-01	8.40E-04	
	Uncertainty in uranium concentration (µg/ml):	1.62E-02	8.40E-05	
	Weight uranium leached (g):	8.42E-06	4.37E-08	8.47E-06
	Uncertainty in weight uranium leached (g):	8.49E-07	4.40E-09	8.49E-07
	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):	7.18E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.73	< 2.08	< 5.81
	Weight of impurity in blank (µg):	< 2.10	< 2.04	
	Minimum corrected weight of impurity in sample (µg):	1.63	0.00	1.63
	Maximum corrected weight of impurity in sample (µg):	3.73	2.08	5.81
Cr	Measured concentration of impurity in sample (µg/ml):	1.15E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.60	< 0.26	< 0.86
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.34	0.00	0.34
	Maximum corrected weight of impurity in sample (µg):	0.60	0.26	0.86
Mn	Measured concentration of impurity in sample (µg/ml):	2.35E-01	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	12.22	< 0.52	<12.74
	Weight of impurity in blank (µg):	< 0.53	< 0.51	
	Minimum corrected weight of impurity in sample (µg):	11.70	0.00	11.70
	Maximum corrected weight of impurity in sample (µg):	12.22	0.52	12.74
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.21	< 0.21	< 0.42
	Weight of impurity in blank (µg):	< 0.21	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.21	0.21	0.42
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 1.04	< 1.04	< 2.08
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.04	1.04	2.08
Ca	Measured concentration of impurity in sample (µg/ml):	2.04E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	106.08	< 5.20	<111.28
	Weight of impurity in blank (µg):	< 5.25	< 5.10	
	Minimum corrected weight of impurity in sample (µg):	100.83	0.00	100.83
	Maximum corrected weight of impurity in sample (µg):	106.08	5.20	111.28
Al	Measured concentration of impurity in sample (µg/ml):	1.33E+00	2.78E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	69.16	1.45	70.61
	Weight of impurity in blank (µg):	4.50	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	64.66	0.43	65.09
	Maximum corrected weight of impurity in sample (µg):	64.66	1.45	66.11
Ti	Measured concentration of impurity in sample (µg/ml):	5.51E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	28.65	< 1.04	<29.69
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	27.60	0.00	27.60
	Maximum corrected weight of impurity in sample (µg):	28.65	1.04	29.69
V	Measured concentration of impurity in sample (µg/ml):	1.15E+00	< 5.00E-03	**V**
	Uncorrected weight of impurity in sample (µg):	59.80	< 0.26	<60.06
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	59.54	0.00	59.54
	Maximum corrected weight of impurity in sample (µg):	59.80	0.26	60.06

Comments

Checked by FCM on 7/29/2009 against the official resultls of analyses for RMAL1832

Fred C. Montgomery
Operator

12-15-2009
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	122, 013, 099, 037, 051
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040702	B09040902	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.0	52.0	
	Radiochemical laboratory analysis number:	1832-008	1832-013	
	Measured uranium concentration (µg/ml):	1.18E-01	8.20E-04	
	Uncertainty in uranium concentration (µg/ml):	1.18E-02	8.20E-05	
	Weight uranium leached (g):	5.78E-06	4.26E-08	5.82E-06
	Uncertainty in weight uranium leached (g):	5.83E-07	4.30E-09	5.83E-07
	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):	6.74E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	3.30	< 2.08	< 5.38
	Weight of impurity in blank (µg):	< 2.10	< 2.04	
	Minimum corrected weight of impurity in sample (µg):	1.20	0.00	1.20
	Maximum corrected weight of impurity in sample (µg):	3.30	2.08	5.38
Cr	Measured concentration of impurity in sample (µg/ml):	1.23E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.60	< 0.26	< 0.86
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.34	0.00	0.34
	Maximum corrected weight of impurity in sample (µg):	0.60	0.26	0.86
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.49	< 0.52	< 1.01
	Weight of impurity in blank (µg):	< 0.53	< 0.51	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.49	0.52	1.01
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.20	< 0.21	< 0.41
	Weight of impurity in blank (µg):	< 0.21	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.20	0.21	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 0.98	< 1.04	< 2.02
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.98	1.04	2.02
Ca	Measured concentration of impurity in sample (µg/ml):	2.86E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	140.14	< 5.20	<145.34
	Weight of impurity in blank (µg):	< 5.25	< 5.10	
	Minimum corrected weight of impurity in sample (µg):	134.89	0.00	134.89
	Maximum corrected weight of impurity in sample (µg):	140.14	5.20	145.34
Al	Measured concentration of impurity in sample (µg/ml):	1.33E+00	3.26E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	65.17	1.70	66.87
	Weight of impurity in blank (µg):	4.50	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	60.67	0.68	61.35
	Maximum corrected weight of impurity in sample (µg):	60.67	1.70	62.37
Ti	Measured concentration of impurity in sample (µg/ml):	4.14E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	20.29	< 1.04	<21.33
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	19.24	0.00	19.24
	Maximum corrected weight of impurity in sample (µg):	20.29	1.04	21.33
V	Measured concentration of impurity in sample (µg/ml):	1.22E+00	5.37E-03	**V**
	Uncorrected weight of impurity in sample (µg):	59.78	0.28	60.06
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	59.52	0.02	59.54
	Maximum corrected weight of impurity in sample (µg):	59.78	0.28	60.06

Comments

Checked by FCM on 7/29/2009 against the official resultls of analyses for RMAL1832

Fred C. Montgomery
Operator

12-15-2009
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	070, 126, 057, 069, 098
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040703	B09040903	
	Number of compacts:	5		
	Total volume of leach solution (ml):	50.5	50.5	
	Radiochemical laboratory analysis number:	1832-009	1832-014	
	Measured uranium concentration (µg/ml):	7.10E-02	6.90E-04	
	Uncertainty in uranium concentration (µg/ml):	7.10E-03	6.90E-05	
	Weight uranium leached (g):	3.59E-06	3.48E-08	3.62E-06
	Uncertainty in weight uranium leached (g):	3.62E-07	3.51E-09	3.62E-07
	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):	6.33E-02	< 4.00E-02	Fe
	Uncorrected weight of impurity in sample (µg):	3.20	< 2.02	< 5.22
	Weight of impurity in blank (µg):	< 2.10	< 2.04	
	Minimum corrected weight of impurity in sample (µg):	1.10	0.00	1.10
	Maximum corrected weight of impurity in sample (µg):	3.20	2.02	5.22
Cr	Measured concentration of impurity in sample (µg/ml):	1.34E-02	< 5.00E-03	Cr
	Uncorrected weight of impurity in sample (µg):	0.68	< 0.25	< 0.93
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.41	0.00	0.41
	Maximum corrected weight of impurity in sample (µg):	0.68	0.25	0.93
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	Mn
	Uncorrected weight of impurity in sample (µg):	< 0.51	< 0.51	< 1.01
	Weight of impurity in blank (µg):	< 0.53	< 0.51	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.51	0.51	1.01
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	Co
	Uncorrected weight of impurity in sample (µg):	< 0.21	< 0.21	< 0.41
	Weight of impurity in blank (µg):	< 0.21	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.21	0.21	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	Ni
	Uncorrected weight of impurity in sample (µg):	< 1.01	< 1.01	< 2.02
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	1.01	1.01	2.02
Ca	Measured concentration of impurity in sample (µg/ml):	2.12E+00	< 1.00E-01	Ca
	Uncorrected weight of impurity in sample (µg):	107.06	< 5.05	<112.11
	Weight of impurity in blank (µg):	< 5.25	< 5.10	
	Minimum corrected weight of impurity in sample (µg):	101.81	0.00	101.81
	Maximum corrected weight of impurity in sample (µg):	107.06	5.05	112.11
Al	Measured concentration of impurity in sample (µg/ml):	1.36E+00	3.10E-02	Al
	Uncorrected weight of impurity in sample (µg):	68.68	1.57	70.25
	Weight of impurity in blank (µg):	4.50	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	64.18	0.55	64.73
	Maximum corrected weight of impurity in sample (µg):	64.18	1.57	65.75
Ti	Measured concentration of impurity in sample (µg/ml):	4.79E-01	2.06E-02	Ti
	Uncorrected weight of impurity in sample (µg):	24.19	1.04	25.23
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	23.14	0.02	23.16
	Maximum corrected weight of impurity in sample (µg):	24.19	1.04	25.23
V	Measured concentration of impurity in sample (µg/ml):	1.17E+00	5.99E-03	V
	Uncorrected weight of impurity in sample (µg):	59.09	0.30	59.39
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	58.82	0.05	58.87
	Maximum corrected weight of impurity in sample (µg):	59.09	0.30	59.39

Comments

Checked by FCM on 7/29/2009 against the official results of analyses for RMAL1832

Fred C. Montgomery
Operator

12-15-2009
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	059, 014, 062, 073, 040
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040704	B09040904	
	Number of compacts:	5		
	Total volume of leach solution (ml):	49.0	51.0	
	Radiochemical laboratory analysis number:	1832-010	1832-015	
	Measured uranium concentration (µg/ml):	1.03E-01	8.60E-04	
	Uncertainty in uranium concentration (µg/ml):	1.03E-02	8.60E-05	
	Weight uranium leached (g):	5.05E-06	4.39E-08	5.09E-06
	Uncertainty in weight uranium leached (g):	5.09E-07	4.42E-09	5.09E-07
	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):	8.46E-02	< 4.00E-02	**Fe**
	Uncorrected weight of impurity in sample (µg):	4.15	< 2.04	< 6.19
	Weight of impurity in blank (µg):	< 2.10	< 2.04	
	Minimum corrected weight of impurity in sample (µg):	2.05	0.00	2.05
	Maximum corrected weight of impurity in sample (µg):	4.15	2.04	6.19
Cr	Measured concentration of impurity in sample (µg/ml):	1.24E-02	< 5.00E-03	**Cr**
	Uncorrected weight of impurity in sample (µg):	0.61	< 0.26	< 0.86
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	0.35	0.00	0.35
	Maximum corrected weight of impurity in sample (µg):	0.61	0.26	0.86
Mn	Measured concentration of impurity in sample (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Uncorrected weight of impurity in sample (µg):	< 0.49	< 0.51	< 1.00
	Weight of impurity in blank (µg):	< 0.53	< 0.51	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.49	0.51	1.00
Co	Measured concentration of impurity in sample (µg/ml):	< 4.06E-03	< 4.06E-03	**Co**
	Uncorrected weight of impurity in sample (µg):	< 0.20	< 0.21	< 0.41
	Weight of impurity in blank (µg):	< 0.21	< 0.23	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.20	0.21	0.41
Ni	Measured concentration of impurity in sample (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Uncorrected weight of impurity in sample (µg):	< 0.98	< 1.02	< 2.00
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00
	Maximum corrected weight of impurity in sample (µg):	0.98	1.02	2.00
Ca	Measured concentration of impurity in sample (µg/ml):	1.79E+00	< 1.00E-01	**Ca**
	Uncorrected weight of impurity in sample (µg):	87.71	< 5.10	<92.81
	Weight of impurity in blank (µg):	< 5.25	< 5.10	
	Minimum corrected weight of impurity in sample (µg):	82.46	0.00	82.46
	Maximum corrected weight of impurity in sample (µg):	87.71	5.10	92.81
Al	Measured concentration of impurity in sample (µg/ml):	1.36E+00	3.11E-02	**Al**
	Uncorrected weight of impurity in sample (µg):	66.64	1.59	68.23
	Weight of impurity in blank (µg):	4.50	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	62.14	0.57	62.71
	Maximum corrected weight of impurity in sample (µg):	62.14	1.59	63.73
Ti	Measured concentration of impurity in sample (µg/ml):	5.49E-01	< 2.00E-02	**Ti**
	Uncorrected weight of impurity in sample (µg):	26.90	< 1.02	<27.92
	Weight of impurity in blank (µg):	< 1.05	< 1.02	
	Minimum corrected weight of impurity in sample (µg):	25.85	0.00	25.85
	Maximum corrected weight of impurity in sample (µg):	26.90	1.02	27.92
V	Measured concentration of impurity in sample (µg/ml):	1.25E+00	6.55E-03	**V**
	Uncorrected weight of impurity in sample (µg):	61.25	0.33	61.58
	Weight of impurity in blank (µg):	< 0.26	< 0.26	
	Minimum corrected weight of impurity in sample (µg):	60.99	0.08	61.07
	Maximum corrected weight of impurity in sample (µg):	61.25	0.33	61.58

Comments

Checked by FCM on 7/29/2009 against the official resultls of analyses for RMAL1832

Fred C. Montgomery
Operator

12-15-2009
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:	LEU06-OP1-Z
Compact lot description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A
Compact ID numbers:	Burn-Leach Blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\LEU06-OP1-Z_DRF26R1_02B.xls

Mean average weight uranium per particle (g):	3.95E-04
Uncertainty in mean average weight uranium per particle (g):	1.00E-06

		First Leach	Second Leach	Total
	Burn-leach solution ID:	B09040705	B09040905	
	Number of compacts:	None		
	Total volume of leach solution (ml):	52.5	51.0	
	Radiochemical laboratory analysis number:	1832-011	1832-016	
	Measured uranium concentration (µg/ml):	9.96E-03	< 5.00E-04	
	Uncertainty in uranium concentration (µg/ml):	9.96E-04		
	Weight uranium leached (g):	5.23E-07	< 2.63E-08	5.49E-07
	Uncertainty in weight uranium leached (g):	5.27E-08		
	Number of leached kernels:	0.0	0.0	0.0
	Uncertainty in number of leached kernels:	0.0		
Fe	Measured concentration (µg/ml):	< 4.00E-02	< 4.00E-02	**Fe**
	Total weight of leached impurity (µg):	< 2.10	< 2.04	< 4.14
Cr	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	**Cr**
	Total weight of leached impurity (µg):	< 0.26	< 0.26	< 0.52
Mn	Measured concentration (µg/ml):	< 1.00E-02	< 1.00E-02	**Mn**
	Total weight of leached impurity (µg):	< 0.53	< 0.51	< 1.04
Co	Measured concentration (µg/ml):	< 4.06E-03	< 4.60E-03	**Co**
	Total weight of leached impurity (µg):	< 0.21	< 0.23	< 0.45
Ni	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	**Ni**
	Total weight of leached impurity (µg):	< 1.05	< 1.02	< 2.07
Ca	Measured concentration (µg/ml):	< 1.00E-01	< 1.00E-01	**Ca**
	Total weight of leached impurity (µg):	< 5.25	< 5.10	<10.35
Al	Measured concentration (µg/ml):	8.57E-02	< 2.00E-02	**Al**
	Total weight of leached impurity (µg):	4.50	< 1.02	< 5.52
Ti	Measured concentration (µg/ml):	< 2.00E-02	< 2.00E-02	**Ti**
	Total weight of leached impurity (µg):	< 1.05	< 1.02	< 2.07
V	Measured concentration (µg/ml):	< 5.00E-03	< 5.00E-03	**V**
	Total weight of leached impurity (µg):	< 0.26	< 0.26	< 0.52

Comments

Checked by FCM on 7/29/2009 against the official resultls of analyses for RMAL1832

Fred C. Montgomery
Operator

12-15-2009
Date

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 0.0113±0.0002 to 0.0145±0.0008 (1.0338±0.0007 to 1.0436±0.0024 in terms of effective BAFo). The diattenuation of the OPyC increased from 0.0083±0.0005 to 0.0136±0.0003 (1.0248±0.0015 to 1.0407±0.0009 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/C. Silva
Mount ID:	M09111201
Sample ID:	LEU06-OP1-Z115
Sample Description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A, after compacting
Folder containing data:	\\mc-agr\AGR\2-MGEM\R09120301\

Particle #	Grid Position	Diattenuation			Equivalent BAFo = 1+3N		
		Average	St. Dev.	Ave. Error	Average	St. Dev.	Ave. Error
1	4,4	0.0157	0.0029	0.0005	1.0471	0.0087	0.0015
2	4,5	0.0148	0.0026	0.0005	1.0444	0.0078	0.0015
3	4,6	0.0131	0.0023	0.0005	1.0393	0.0069	0.0015
4	5,4	0.0150	0.0029	0.0005	1.0450	0.0087	0.0015
5	5,5	0.0145	0.0021	0.0005	1.0435	0.0063	0.0015
6	5,6	0.0154	0.0025	0.0005	1.0462	0.0075	0.0015
7	6,4	0.0139	0.0025	0.0005	1.0417	0.0075	0.0015
8	6,5	0.0151	0.0025	0.0005	1.0453	0.0075	0.0015
9	6,6	0.0138	0.0026	0.0005	1.0414	0.0078	0.0015
10	5,7	0.0141	0.0026	0.0006	1.0423	0.0078	0.0018
Average		0.0145	0.0026	0.0005	1.0436	0.0077	0.0015

Mean of average BAFo per particle:	1.0436
Standard deviation of average BAFo per particle:	0.0024

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/C. Silva
Mount ID:	M09111201
Sample ID:	LEU06-OP1-Z115
Sample Description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A, after compacting
Folder containing data:	\\mc-agr\AGR\2-MGEM\R09120301\

Particle #	Grid Position	Diattenuation			Equivalent BAFo = 1+3N		
		Average	St. Dev.	Ave. Error	Average	St. Dev.	Ave. Error
1	4,4	0.0132	0.0025	0.0007	1.0396	0.0075	0.0021
2	4,5	0.0139	0.0028	0.0007	1.0417	0.0084	0.0021
3	4,6	0.0133	0.0027	0.0007	1.0399	0.0081	0.0021
4	5,4	0.0140	0.0028	0.0007	1.0420	0.0084	0.0021
5	5,5	0.0137	0.0025	0.0006	1.0411	0.0075	0.0018
6	5,6	0.0136	0.0025	0.0007	1.0408	0.0075	0.0021
7	6,4	0.0132	0.0028	0.0007	1.0396	0.0084	0.0021
8	6,5	0.0138	0.0028	0.0007	1.0414	0.0084	0.0021
9	6,6	0.0133	0.0041	0.0007	1.0399	0.0123	0.0021
10	5,7	0.0135	0.0027	0.0007	1.0405	0.0081	0.0021
Average		0.0136	0.0028	0.0007	1.0407	0.0085	0.0021

Mean of average BAFo per particle:	1.0407
Standard deviation of average BAFo per particle:	0.0009

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/C. Silva
Mount ID:	M09111201
Sample ID:	LEU06-OP1-Z115
Sample Description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A, after compacting
Folder containing data:	\\mc-agr\AGR\2-MGEM\R09120301\

Particle #	Grid Position	Diattenuation			True BAFo = (1+N)/(1-N)		
		Average	St. Dev.	Ave. Error	Average	St. Dev.	Ave. Error
1	4,4	0.0157	0.0029	0.0005	1.0319	0.0060	0.0010
2	4,5	0.0148	0.0026	0.0005	1.0300	0.0054	0.0010
3	4,6	0.0131	0.0023	0.0005	1.0265	0.0047	0.0010
4	5,4	0.0150	0.0029	0.0005	1.0305	0.0060	0.0010
5	5,5	0.0145	0.0021	0.0005	1.0294	0.0043	0.0010
6	5,6	0.0154	0.0025	0.0005	1.0313	0.0052	0.0010
7	6,4	0.0139	0.0025	0.0005	1.0282	0.0051	0.0010
8	6,5	0.0151	0.0025	0.0005	1.0307	0.0052	0.0010
9	6,6	0.0138	0.0026	0.0005	1.0280	0.0053	0.0010
10	5,7	0.0141	0.0026	0.0006	1.0286	0.0053	0.0012
Average		0.0145	0.0026	0.0005	1.0295	0.0053	0.0011

Mean of average BAFo per particle:	1.0295
Standard deviation of average BAFo per particle:	0.0017

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/C. Silva
Mount ID:	M09111201
Sample ID:	LEU06-OP1-Z115
Sample Description:	AGR-2 UCO Variant Fuel, from G73J-14-93074A, after compacting
Folder containing data:	\\mc-agr\AGR\2-MGEM\R09120301\

Particle #	Grid Position	Diattenuation			True BAFo = (1+N)/(1-N)		
		Average	St. Dev.	Ave. Error	Average	St. Dev.	Ave. Error
1	4,4	0.0132	0.0025	0.0007	1.0268	0.0051	0.0014
2	4,5	0.0139	0.0028	0.0007	1.0282	0.0058	0.0014
3	4,6	0.0133	0.0027	0.0007	1.0270	0.0055	0.0014
4	5,4	0.0140	0.0028	0.0007	1.0284	0.0058	0.0014
5	5,5	0.0137	0.0025	0.0006	1.0278	0.0051	0.0012
6	5,6	0.0136	0.0025	0.0007	1.0276	0.0051	0.0014
7	6,4	0.0132	0.0028	0.0007	1.0268	0.0058	0.0014
8	6,5	0.0138	0.0028	0.0007	1.0280	0.0058	0.0014
9	6,6	0.0133	0.0041	0.0007	1.0270	0.0084	0.0014
10	5,7	0.0135	0.0027	0.0007	1.0274	0.0055	0.0014
Average		0.0136	0.0028	0.0007	1.0275	0.0058	0.0014

Mean of average BAFo per particle:	1.0275
Standard deviation of average BAFo per particle:	0.0006

Comments

G. E. Jellison
Operator

12/16/09
Date

Appendix A: Certificate of Conformance

This section contains the Certificate of Conformance for the LEU06-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.

ORNL/TM-2009/304

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 Variant, LEU06-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	002	1	MCV	12/23/09	FC	042	1	MCV	12/23/09
FC	004	1			FC	043	1		
FC	006	1			FC	044	1		
FC	008	1			FC	045	1		
FC	009	1			FC	046	1		
FC	010	1			FC	048	1		
FC	011	1			FC	049	1		
FC	012	1			FC	050	1		
FC	017	1			FC	052	1		
FC	019	1			FC	053	1		
FC	020	1			FC	055	1		
FC	021	1			FC	056	1		
FC	022	1			FC	060	1		
FC	025	1			FC	061	1		
FC	026	1			FC	065	1		
FC	028	1			FC	066	1		
FC	029	1			FC	067	1		
FC	030	1			FC	068	1		
FC	033	1			FC	071	1		
FC	034	1			FC	072	1		
FC	036	1			FC	075	1		
FC	038	1			FC	076	1		
FC	039	1			FC	077	1		
FC	041	1			FC	079	1		

5. LIST OF APPLICABLE NONCONFORMANCE REPORT NUMBERS (NCRs attached in Appendix B of data package): NCR-X-MSTD-AGR-10-01, NCR-X-MSTD-AGR-10-02, INL NCR 44791

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.

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

12/23/09
Date

* FC indicates fuel compact

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 Variant, LEU06-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	080	1	MCV	12/23/09	FC	113	1	MCV	12/23/09
FC	081	1			FC	114	1		
FC	082	1			FC	116	1		
FC	084	1			FC	117	1		
FC	085	1			FC	118	1		
FC	086	1			FC	119	1		
FC	087	1			FC	121	1		
FC	088	1			FC	123	1		
FC	090	1			FC	124	1		
FC	091	1			FC	125	1		
FC	092	1			FC	127	1		
FC	093	1			FC	128	1		
FC	095	1			FC	130	1		
FC	096	1			FC	132	1		
FC	097	1			FC	133	1		
FC	100	1			FC	134	1		
FC	101	1							
FC	102	1							
FC	103	1							
FC	104	1							
FC	105	1							
FC	106	1							
FC	109	1							
FC	112	1							

5. LIST OF APPLICABLE NONCONFORMANCE REPORT NUMBERS (NCRs attached in Appendix B of data package): NCR-X-MSTD-AGR-10-01, NCR-X-MSTD-AGR-10-02, INL NCR 44791

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.

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

12/23/09
Date

* FC indicates fuel compact

Appendix B: Nonconformance Reports

This section contains the applicable Nonconformance Reports for the LEU06-OP1-Z compact lot. Nonconformances related to compact length and calcium impurity content were 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. This damage is thought to have occurred at B&W during removal of the particles from the coating furnace via a suction transfer system. 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.

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 (NCR)

1.a. ATS TRACKING NUMBER:	2. DIVISION / ORGANIZATION	3. SUBCONTRACT #	4. PROJECT TITLE / JOB #
1.b. NCR - X-MSTD-AGR-10-02	Materials Sci. & Tech.	N/A	AGR Program
5. HOLD/REJECT TAG # / SEGREGATION AREA	**6. IDENTIFICATION DATE**	**7. IDENTIFIER**	
N/A - tracking by NCR number	December 8, 2009	Fred Montgomery	

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 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

Calcium content outside SiC: mean ≤50 μg/compact at 95% confidence

16. NONCONFORMANCE

Mean measured calcium impurity = 78 μg/compact
Standard deviation in mean = 46 μg/compact
95% confidence test value = 109 μg/compact > 50 μg/compact

17. EVALUATION, REMEDIAL ACTION, AND TECHNICAL JUSTIFICATION

The measured calcium impurity content in the compacts was above the specified upper limit. However, it was determined that the cause of the measured value being too high was likely due to uncertainty in the analysis, as opposed to an actual high concentration of calcium in the compacts. Accurate analysis of calcium is difficult due to the need to use the peak from the Ca-44 isotope for the mass spectrometry (the Ca-40 peak overlaps with other peaks in the spectrum). The abundance of this isotope is only 2%, which results in a large multiplier on the measurement uncertainty. Re-analysis resulted in an acceptance test value of 49.6, which would pass the specification. Comparison of the two sets of analyses clearly indicated a relatively large uncertainty in the measured value for calcium. Comparison of the results for all 8 sample groups indicated that some of the values obtained in the first analysis were probably erroneously high. In addition, the current upper limit on the calcium impurity level of 50 μg/compact is thought to be conservative and a slightly higher calcium impurity level is not expected to adversely affect fuel performance. It was therefore determined that the compacts could be used as is.

Measurement of the calcium impurity by ORNL Analytical chemistry using inductively coupled plasma mass spectroscopy (ICP-MS) in some cases results in an apparent measurement uncertainty that is too large to determine the product's acceptance for calcium impurity content. However, ICP-MS has proven sufficient for all other analyzed impurity elements and an efficient replacement for the calcium analysis is not available.

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 for DAP 12-23-09	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	2A

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)