ORNL/TM-2018/774

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April 2018

OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE US DEPARTMENT OF ENERGY

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Fusion and Materials for Nuclear Systems Division

CONFIRMATORY LBL ANALYSIS OF AGR-5/6/7 COMPACTS AND OVER-COATED PARTICLES

BWXT BATCHES 11034, 14154C, 14156C, AND 14156D

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Date Published: April 2018

Work sponsored by
US DEPARTMENT OF ENERGY
Office of Nuclear Energy
under the
Advanced Gas Reactor Fuel Development and Qualification Program

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managed by
UT-BATTELLE, LLC
for the
US DEPARTMENT OF ENERGY
under contract DE-AC05-00OR22725

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ACRONYMS

AGR	Advanced Gas Reactor (Fuel Development and Qualification Program)
AGR-5/6/7	Fifth/sixth/seventh AGR program irradiation experiments
ATR	Advanced Test Reactor
BWXT	BWX Technologies (Nuclear Operations Group in Lynchburg, Virginia)
CVD	Chemical vapor deposition
DAM	Data Acquisition Method
DRF	Data Report Form
DUF	Dispersed Uranium Fraction
EKF	Exposed Kernel Fraction
INL	Idaho National Laboratory
IPyC	Inner pyrolytic carbon (TRISO layer)
IRF	Inspection Report Form
LBL	Leach-burn-leach
MDL	Minimum detection limit
OPyC	Outer pyrolytic carbon (TRISO layer)
ORNL	Oak Ridge National Laboratory
PF	Packing Fraction (TRISO volume fraction in a compact)
PyC	Pyrolytic carbon
QC	Quality control
SDF	SiC Defect Fraction
SiC	Silicon carbide (TRISO layer)
TRISO	Tristructural-isotropic (coated particles)
UCO	Uranium carbide/uranium oxide mixture (fuel kernels)

ACKNOWLEDGMENTS

This work was sponsored by the U.S. Department of Energy, Office of Nuclear Energy, through the Idaho National Laboratory Advanced Reactor Technologies Technology Development Office as part of the Advanced Gas Reactor Fuel Development and Qualification Program.

1. INTRODUCTION

Fuel for the Advanced Gas Reactor Fuel Development and Qualification (AGR) Program's AGR-5/6/7 irradiation test in the Idaho National Laboratory (INL) Advanced Test Reactor (ATR) was produced by BWX Technologies (BWXT) Nuclear Operations Group in Lynchburg, Virginia. Tristructural isotropic (TRISO) coatings were deposited using a 150-mm-diameter production-scale fluidized-bed chemical vapor deposition (CVD) furnace on 425-µm-nominal-diameter spherical kernels from Lot J52R-16-69317 containing a mixture of 15.5% ^{235}U low-enriched uranium carbide and uranium oxide (UCO). The TRISO coatings consisted of four consecutive CVD layers: a ~50% dense carbon buffer layer with 100-µm-nominal thickness, a dense inner pyrolytic carbon (IPyC) layer with 40-µm-nominal thickness, a silicon carbide (SiC) layer with 35-µm-nominal thickness, and a dense outer pyrolytic carbon (OPyC) layer with 40-µm-nominal thickness. TRISO-coated particle Lot J52R-16-98005 was over-coated with a graphite/resin blend and these over-coated particles were pressed in half-inch-diameter, one-inch-long cylindrical compacts. Two packing fractions (PF) were produced, 40%PF and 25%PF, where the TRISO particle volume made up approximately 40% and 25% of the total compact volume, respectively.

The AGR-5/6/7 Fuel Specification, SPC-1352 [Marshall 2016], provides the requirements necessary for acceptance of the fuel manufactured for the AGR-5/6/7 irradiation test. Quality control (QC) acceptance testing for all AGR-5/6/7 composited lots and single batches was performed by BWXT, with the exception of pyrolytic carbon (PyC) anisotropy and defective IPyC fraction in the TRISO candidate batches and final composite, which were measured at the Oak Ridge National Laboratory (ORNL) and reported in ORNL/TM-2017/036 [Hunn et al. 2017] and ORNL/TM-2017/037 [Helmreich et al. 2017a].

Confirmatory leach-burn-leach (LBL) analysis was performed at ORNL to provide additional data for evaluating the compact properties measured by LBL analysis at BWXT. Samples from compact Batches J52R-16-14154C (40%PF), J52R-16-14156C (25%PF), and J52R-16-14156D (25%PF) were shipped from BWXT to ORNL for deconsolidation and LBL analysis to help evaluate and confirm previous BWXT measurement of three important TRISO particle defect fractions in the final compacted form: the exposed kernel fraction (EKF), the SiC defect fraction (SDF), and the dispersed uranium fraction (DUF). Select impurities (Fe, Cr, Mn, Co, Ni, Ca, Al, Ti, and V) were also measured on some sub-samples. In addition, a sample from over-coated particle Batch J52R-16-11034 (used for the 40%PF compacts) was shipped to ORNL to perform LBL analysis of the defect fractions in the compact feedstock at that stage for comparison to the defect fractions measured in the TRISO particle lot before over-coating and in the 40%PF compact batches. The definitions of EKF, SDF, and DUF are further explained in Section 2, and the method for their calculation according to the AGR-5/6/7 Fuel Specification is summarized.

2. ANALYSIS METHOD

Deconsolidation and LBL analysis was performed on BWXT compact Batches J52R-16-14154C (40%PF), J52R-16-14156C (25%PF), and J52R-16-14156D (25%PF) according to data acquisition method (DAM) AGR-CHAR-DAM-26 [Hunn and Montgomery 2018a]. This DAM provides the instructions for performing deconsolidation and LBL analysis of cylindrical compacts containing coated particles. The LBL method attempts to thoroughly leach uranium (and other metallic impurities) not contained within gas and liquid-tight SiC layers. The AGR-5/6/7 Fuel Specification [Marshall 2016] has specified limits for the amount of selected metallic impurities (Fe, Cr, Mn, Co, Ni, Ca, Al, Ti, and V) in a compact outside intact SiC layers. The specification also includes a series of calculations that use the amount of uranium leached before and after burning off exposed carbon to calculate EKF, SDF, and DUF, as described below, and specifies limits on these fractions.

Following DAM-26, compacts were electrolytically deconsolidated to separate the coated particles from the surrounding matrix of graphite and carbonized resin. This process involves submerging the tip of a compact in nitric acid and applying a voltage between the compact (the anode) and a platinum cathode in contact with the acid. During electrolytic deconsolidation, intercalation of nitrate anions and nitric acid between the basal planes of the graphite material in the compact matrix dissociates the graphite structure, breaks up the matrix, and releases the coated particles. Compacts were analyzed in randomly-selected "clutches" of five compacts each. All compacts in a given clutch were sequentially deconsolidated into the same vessel by stacking them in a cylindrical-shaped deconsolidation tube with an open mesh bottom and a diameter slightly larger than the compacts. The deconsolidation tube was lowered into a vessel containing nitric acid to wet the tip of the bottom compact and a weighted rod with the anode wire placed on the top compact. As the lowest compact in the stack was deconsolidated, the compacts were gravity-fed downward such that the bottom of the lowest compact remained in contact with the acid until all compacts were deconsolidated.

Deconsolidated particles and matrix debris were subjected to two 24-hour pre-burn leaches in boiling concentrated nitric acid. The deconsolidation acid was used for the first pre-burn leach because some exposed uranium and metallic impurities are dissolved in the room temperature acid during the deconsolidation phase. This first pre-burn leach acid was separated from the particles and matrix debris and fresh acid was used for the second leach. Aliquots from the leach solutions were analyzed by mass spectrometry to determine the concentration of U and selected impurities dissolved in the acid. Measured concentrations were converted to mass quantities by multiplying by the collected volume of each leach solution. The equivalent number of leached kernels (kernel-equivalent) was determined by dividing the total mass of uranium dissolved during the pre-burn leach by the average uranium content of one kernel.

Sample clutches are typically leached at least twice; and if the uranium detected in the second leach is above the minimum detection limit and more than 10–20% of the amount detected in the first leach, then this is an indicator that uranium leaching may have been incomplete and additional leaching is needed for better confidence in the results. Best practice is to postpone the burn phase until the uranium analysis of the first two pre-burn leaches is completed; this allows for the option of additional leaching in the pre-burn state if the second leach value indicates incomplete leaching of exposed uranium. However, because of schedule restraints for the current analysis, samples were subjected to burn-leach before pre-burn leach results were available.

After two 24-hour pre-burn leaches, each sample was heated at 750ºC in air for 72 hours to oxidize and remove any exposed carbonaceous material, which would include the compact matrix carbon, the OPyC, and any IPyC and buffer coatings that were exposed to air due to a through-layer defect in the SiC layer. Uranium and metallic impurities exposed by the burn or not completely dissolved during the pre-burn

leach phase will also be oxidized during the burn phase, which makes them more soluble in hot nitric acid during the post-burn leach phase.

Similar to the pre-burn leach phase, the "burned-back" particles and any residual ash were subjected to two 24-hour leaches in hot nitric acid to dissolve any exposed uranium and/or impurities. These post-burn leaches were done just below the 120°C boiling point of the ~70% concentrated nitric to minimize the chance of the solutions bumping, which can violently eject particles from the heating flask. Aliquots from the leach solutions were analyzed the same as the pre-burn leach solutions.

The AGR-5/6/7 fuel specification [Marshall 2016] provides a method for determining the EKF, SDF, and DUF based on the following definitions and assumptions. A particle is considered to have an exposed-kernel defect if the coating layers cannot prevent nitric acid from penetrating to the kernel during the pre-burn leach phase. Such a particle would be likely to perform poorly in a reactor and release an undesirable fraction of the radioactive material it was designed to retain. A particle is considered to have a SiC defect if uranium in the kernel is retained during pre-burn leaching but can be acid leached after removal of the exposed carbon coating layers by heating in air during the burn step described above. Obviously, particles with exposed-kernel defects also have through-layer defects in the SiC, but these particles are not counted again as SiC-defect particles because counting them as exposed-kernel defects already fully accounts for their impact on particle performance, as particles with exposed-kernel defects are presumed to release more fission products than those with SiC defects.

It is assumed that uranium in a particle with an exposed-kernel defect or SiC defect will be almost completely leached during the pre-burn leach or post-burn leach phase, respectively, yielding close to the average uranium content of one kernel. If the total amount of uranium detected in either the pre-burn leaching or post-burn leaching of a clutch is below 0.5 kernel-equivalents, the fuel specification states that this uranium will be identified as dispersed uranium contamination not associated with an individual particle with an exposed-kernel defect or SiC defect. The dispersed uranium fraction is this dispersed uranium contamination divided by the amount of uranium in the clutch, which is approximately equivalent to the kernel-equivalent amount of dispersed uranium divided by the average number of particles in a clutch.

Based on the methods prescribed in the AGR-5/6/7 fuel specification, a pre-burn leach dispersed uranium fraction (DUF_{Pre}) was determined for each clutch whose cumulative leached uranium during the pre-burn leaching was <0.5 kernel-equivalents. Similarly, a post-burn leach dispersed uranium fraction (DUF_{Post}) was determined for each clutch whose cumulative leached uranium during the post-burn leaching was <0.5 kernel-equivalents. Means and standard deviations for the DUF_{Pre} and DUF_{Post} measurements from each sample were calculated using all clutches from the sample for which a DUF value was determined. As prescribed in the AGR-5/6/7 fuel specification, the measured mean DUF_{Total} for each sample was calculated as the sum of the mean DUF_{Pre} and DUF_{Post}. This implies an assumption that the DUF_{Pre} and DUF_{Post} values are measurements of variable properties of the batch and these properties are independent.

Student's t-test statistics were applied to the mean (μ) and standard distribution (σ) of the DUF_{Pre} and DUF_{Post} measurements using the t-test equation and methods described in the AGR-5/6/7 statistical sampling plan [Lybeck and Einerson 2016] to calculate the 95% confidence limits on the maximum mean values of DUF_{Pre} and DUF_{Post} in the sampled batch. Namely, the 95% confidence limit on the maximum mean value in the batch was calculated to be

$$\leq \mu + t_{c,n-1}\left(\sigma/\sqrt{n}\right), \tag{1}$$

where n was the number of determined DUF values and $t_{c,n-1}$ was the one-sided Student's t-distribution critical value for n-1 degrees of freedom and a cumulative probability or confidence (c) of 95%.

The calculation of the 95% confidence limit on the maximum mean value of DUF_{Total} in the sampled batch could not be directly calculated using the simple Student's t-test equation provided in the sampling plan because DUF_{Total} was not based on individual measurements of DUF_{Total} in each clutch but was rather based on the combination of independent measurements of DUF_{Pre} and DUF_{Post}. To calculate the limit value for DUF_{Total}, approximations of the cumulative probability distributions for DUF_{Pre} and DUF_{Post} were constructed using stepwise evaluations of the Student's t-distribution and combined as described below.

In an Excel spreadsheet, a column of discrete maximum mean values of DUF_{Pre} for a range of cumulative probabilities from 0 to 100%, exclusive, was generated using the t-test equation

$$max_i(\mathrm{DUF_{Pre}}) = \mu + t_{c_i,n-1}\left(\sigma/\sqrt{n}\right) \text{ for } i = 1 \text{ to } (100/\Delta) - 1 \text{ and } c_i = i \times \Delta, \quad (2)$$

where μ, σ, and n were based on the DUF_{Pre} measurements (the same used for the 95% confidence calculation in Equation 1), $t_{c_i,n-1}$ was the one-sided Student's t-distribution critical value for n-1 degrees of freedom and a cumulative probability c_i, and Δ was a constant stepsize. Thus, the series of max_i values defined in Equation 2 made up a stepwise approximation of the Student's t cumulative probability distribution for the maximum mean value of DUF_{Pre} in the sampled batch. Each max_i value was a slight overestimate of the possible true mean value of the batch with a probability equal to the stepsize Δ, being the maximum value over the cumulative probability interval (c_i-Δ, c_i].

Similarly, an approximation of the cumulative probability distribution for the maximum mean value of DUF_{Post} in the sampled batch was generated for the same stepsize Δ; and these values were arranged in a row in the Excel spreadsheet so that a matrix could be easily generated by summing all possible pairs of values from the two cumulative probability distributions,

$$sum_{ij} = max_i(\mathrm{DUF_{Pre}}) + max_j(\mathrm{DUF_{Post}}) \text{ for } i \text{ and } j = 1 \text{ to } (100/\Delta) - 1. \quad (3)$$

The probability associated with each individual sum_{ij} combination was the product of the probabilities for the corresponding max_i and max_j, which was Δ^2 in every case. To approximate the 95% confidence limit on the maximum mean value of DUF_{Total}, the individual sum_{ij} values had to be combined as follows.

Starting with the measured mean, $\mu(DUF_{Total})$, for each sample (i.e., the sum of the measured means for DUF_{Pre} and DUF_{Post}), a series of discrete possible maximum mean values of DUF_{Total} was generated over a sufficient range,

$$max_k(\mathrm{DUF_{Total}}) = \mu(\mathrm{DUF_{Total}}) + k \times \partial \text{ for } k = 1 \text{ to } N, \quad (4)$$

where ∂ was a constant stepsize and N was adjusted to ensure enough values were generated in the series to reach a max_k value that corresponded to a 95% cumulative probability. The approximate cumulative probability (c_k) for each possible maximum mean value, $max_k(DUF_{Total})$, was determined by searching the matrix of individual sum_{ij} values and counting the number of sum_{ij} values that were less than or equal to the candidate max_k value,

$$c_k = \Delta^2 \times \mathrm{CountIf}\left(sum_{ij} \le max_k(\mathrm{DUF_{Total}})\right) \text{ for } k = 1 \text{ to } N. \quad (5)$$

The max_k value that corresponded to the c_k value closest to and also greater than or equal to 95% was taken as the best approximation of the 95% confidence limit on the maximum mean value of DUF_{Total} in the sampled batch. The approximation is conservative, as it was calculated to be a slight over-estimate by using the upper bounds in the stepwise approximations of the Student's t cumulative probability

distribution for the maximum mean values of DUF_{Pre} and DUF_{Post}, and it was required to have a confidence of at least 95%. The accuracy of the approximation was dependent on the stepsize Δ used in the stepwise approximations of the Student's t cumulative probability distribution for the maximum mean values of DUF_{Pre} and DUF_{Post}. The stepsize Δ was varied to examine the accuracy of the approximation. As stepsize Δ was reduced, the approximation of the 95% confidence limit on the maximum mean value of DUF_{Total} asymptotically-approached a minimum value from above. The stepsize was small enough to no longer change the value to three significant figures when the stepwise approximations of the Student's t cumulative probability distribution for the maximum mean values of DUF_{Pre} and DUF_{Post} did not change by more than ~0.1% per step. A step size around 0.1% was typically sufficient. The accuracy of the approximation was also dependent on the stepsize ∂ used to generate the search list of discrete possible maximum mean values of DUF_{Total}. The stepsize ∂ was also varied to ensure an accurate approximation was calculated. For ∂, it was important that the candidate max_k values in the search series with corresponding c_k value immediately above and below 95% did not vary when rounded up to three significant figures.

In the definition of the EKF and SDF, according to the AGR-5/6/7 fuel specification, it is assumed that the equivalent number of leached kernels is dominated by individual defective particles in which the uranium in the kernel is exposed because of abnormal or damaged coatings (when they are present). Therefore, these defects are treated as attribute properties and defect fractions are determined from the equivalent number of defective particles versus the number of particles in the measured sample. Binomial distribution statistics are applied to predict the upper limit for the defect fraction at 95% confidence.

Equations for determining EKF and SDF are provided in the AGR-5/6/7 fuel specification [Marshall 2016]. The equivalent number of leached kernels detected during pre-burn leaching of a clutch of compacts is corrected by subtracting the kernel-equivalent contribution from the dispersed uranium (assumed to be the mean DUF_{Pre} times the average number of particles per clutch). This corrected kernel-equivalent value is then rounded to the nearest integer to arrive at the pre-burn exposed kernel count for that clutch. The pre-burn exposed kernel count for all analyzed clutches is summed and divided by the estimated number of analyzed particles (calculated from the average number of particles per clutch times the number of clutches) to get the measured EKF. The 95% confidence limit on the EKF comes from a binomial distribution calculation using the total pre-burn exposed kernel count and estimated number of analyzed particles. The SDF values are calculated in the same way except the equivalent number of leached kernels detected during post-burn leaching of a clutch is corrected with the mean DUF_{Post} value.

Analysis of selected metallic impurities (Fe, Cr, Mn, Co, Ni, Ca, Al, Ti, and V) included subtraction of the impurities measured in a control blank. The control blank is a sample containing no compacts and is processed in the same way and at the same time as the associated compact clutches in the analysis group. One control blank is typically run with each analysis group of up to four clutches but can be associated with more clutches if they are run together. The weight of impurity detected in each individual leach can be adjusted by subtracting the weight of impurity detected in the corresponding leach of the control blank.

Each DAM-26 data report form (DRF) includes two corrected values for each measured impurity weight. The minimum corrected impurity weight is calculated as the measured impurity weight in each sample solution minus the impurity weight in the corresponding control blank solution. If the corresponding impurity weight in the blank was reported as being below a minimum detection limit (MDL), indicated in the DRF as a <-value, then the MDL is used in the calculation. The minimum corrected impurity weight is reported as zero if the measured sample solution impurity weight was reported as an MDL value or the calculation of the minimum corrected impurity weight yielded a negative result. The maximum corrected impurity weight is also calculated as the measured impurity weight in each sample solution minus the impurity weight in the corresponding control blank solution. However, if the corresponding impurity weight in the blank was reported as an MDL, then it is assumed to be zero and nothing is subtracted.

Additionally, if the measured sample solution impurity weight was reported as an MDL, then it is assumed to be equal to the MDL for the calculation. The maximum corrected impurity weight is reported as zero if the calculated maximum corrected impurity weight is negative. The minimum and maximum corrected values represent the possible range on the impurity weight given the uncertainty introduced by values below the MDL. The maximum corrected impurity weight is appropriate for comparison to the fuel specification as it is the highest possible value in this control blank-corrected range.

LBL analysis was performed on BWXT over-coated particle Batch J52R-16-11034 according to AGR-CHAR-DAM-21 [Hunn and Montgomery 2018b]. This procedure is essentially the same as DAM-26 except that the compact deconsolidation is not required prior to the pre-burn acid leaching. The EKF, SDF, and DUF were calculated as they were for the compacts.

3. COMPACTS WITH 25% PACKING FRACTION

Confirmatory LBL analysis was completed on 25%PF compacts from two different BWXT furnace tray batches, 29 compacts from Batch J52R-16-14156C and 11 compacts from Batch J52R-16-14156D. These 40 compacts were mixed together and randomly sampled in clutches of 5 compacts each. The eight clutches were split into two groups of four clutches and each group was processed together with a blank sample. All leach solutions were analyzed for uranium contents and Group 1 leachates were also analyzed for other impurities (Fe, Cr, Mn, Co, Ni, Ca, Al, Ti, and V). Appendix A contains the official pre-burn leach and post-burn leach data report form (DRF) for each analyzed clutch of five compacts and inspection report forms (IRFs) that summarize the data. This data is further presented and discussed in the remainder of this section.

3.1 LBL ANALYSIS FOR EXPOSED URANIUM IN 25%PF COMPACTS

Table 3-1 shows uranium (in kernel-equivalents) in each solution collected during pre-burn leaching of the eight 25%PF compact clutches from Batches J52R-16-14156C and J52R-16-14156D. Also in the table are the individual pre-burn leach total U and DUF_{Pre} (if applicable) for each clutch. The water rinse data was only added to the total if it was >10% of the second leach and >1% of the average uranium per kernel, as noted in the table. Clutches displayed in bold had leached uranium ≥0.5 kernel-equivalents and therefore were counted as containing exposed-kernel defects. Only clutches without exposed-kernel defects were eligible for DUF measurement. Table 3-2 shows similar data for the post-burn leach and Table 3-3 and Table 3-4 summarize the defect fraction results.

Table 3-1. Uranium leached from 25%PF compacts before the burn

Clutch	1st Leach	2nd Leach	Water Rinse	Total	Individual DUF_{Pre}
1	3.66E-2	6.77E-3	6.56E-4	0.04	3.79E-6
2	2.90E-2	6.01E-3	6.18E-4	0.04	3.05E-6
3	1.87E-1	2.87E-2	2.98E-3	0.22	1.88E-5
4	6.74E-2	8.13E-3	1.17E-3	0.08	6.59E-6
5	4.12E-2	4.75E-3	7.66E-4	0.05	4.00E-6
6	**8.70E-1**	**6.29E-2**	**1.56E-2**	**0.95**	---
7	2.81E-2	2.96E-3	4.53E-4	0.03	2.71E-6
8	3.15E-2	5.78E-3	8.55E-4	0.04	3.26E-6

Uranium content in each leach is reported in kernel-equivalents; individual DUF_{Pre} is the pre-burn leach fraction of exposed uranium in each clutch with <0.5 exposed kernel-equivalents; and the water rinse was not added to the total if shaded gray.

Table 3-2. Uranium leached from 25%PF compacts after the burn

Clutch	1st Leach	2nd Leach	Water Rinse	Total	Individual DUF_{Post}
1	1.25E-2	3.59E-4	2.04E-5	0.01	1.13E-6
2	1.35E-2	2.96E-4	2.12E-5	0.01	1.20E-6
3	1.29E-1	2.31E-4	1.79E-5	0.13	1.13E-5
4	1.25E-2	3.94E-4	7.68E-5	0.01	1.13E-6
5	**1.17E+0**	**5.52E-3**	**5.42E-4**	**1.18**	---
6	**2.16E+0**	**5.85E-3**	**4.08E-4**	**2.16**	---
7	1.45E-2	6.71E-4	1.01E-4	0.02	1.32E-6
8	1.35E-2	2.59E-3	1.09E-4	0.02	1.40E-6

Uranium content in each leach is reported in kernel-equivalents; individual DUF_{Post} is the post-burn leach fraction of exposed uranium in each clutch with <0.5 exposed kernel-equivalents; and the water rinse was not added to the total if shaded gray.

Dispersed uranium values were fairly consistent in the pre-burn and post-burn clutches that did not contain a defective particle, with the exception of Clutch 3. Clutch 3 had elevated levels of uranium

detected in both the pre-burn and post-burn leach series and the individual leach values appear to be consistent with normal leaching progression for dispersed uranium in terms of fractional decreases in successive leaches and from pre-burn to post-burn. The uranium in Clutch 3 also had a significantly lower ^{235}U to ^{238}U ratio that indicated that the contamination was dominated by natural uranium. Because the contamination in Clutch 3 appears to be real and not an artifact of the LBL analysis, it should be included in the final DUF results. However, for comparative information, Table 3-3 also shows the combined DUF values with Clutch 3 excluded. The standard deviation in the DUF with the abnormal Clutch 3 excluded was reduced by an order of magnitude.

The DUF_{Total} measured in the ORNL analysis of the combined samples from the two 25%PF compact batches was above the specified limit of DUF_{Total} ≤1E-5 at 95% confidence, while the DUF_{Total} calculated without inclusion of the Clutch 3 data was below the specified limit. Consideration of the DUF values with Clutch 3 excluded indicates that the cause of the compact batches failing to meet the specified criteria for DUF_{Total} may be associated with abnormal contamination in individual compacts. In addition, the fact that the DUF values for Clutch 3 are outside of the normal distribution of the other individual clutch DUF values suggests that the Students t-test may not be appropriate for the calculation of the 95% confidence limit, in this case. The reported values [Marshall 2017] for BWXT measurement of DUF_{Total} in the 25%PF compacts are 2.66E-5 (measured-sample mean) and ≤2.95E-5 (95% confidence limit on mean). These values are higher than and appear to be inconsistent with the ORNL results. Further analysis of the individual leach results obtained by the BWXT analysis is needed to understand this apparent inconsistency.

Table 3-3. Dispersed uranium in 25%PF compacts

		DUF_{Pre}	DUF_{Post}	DUF_{Total}
All 40 compacts	Mean	6.03E-6	2.91E-6	8.94E-6
	Standard deviation	5.78E-6	4.10E-6	
	95% Confidence limit	≤1.03E-5	≤6.29E-6	≤1.45E-5
Excluding Clutch 3	Mean	3.90E-6	1.24E-6	5.14E-6
	Standard deviation	1.40E-6	1.22E-7	
	95% Confidence limit	≤5.06E-6	≤1.36E-6	≤6.31E-6

There appeared to be only one exposed kernel in the pre-burn leach material (located in Clutch 6). That equates to a measured fraction of 1.09E-5 and a 95% confidence limit of ≤5.18E-5 (Table 3-4). This is slightly above the specified limit of EKF ≤5E-5 at 95% confidence but the measured data indicate that analysis of additional compacts to reduce the statistical penalty in the binomial distribution calculation of the 95% confidence limit would result in a value below the specified limit. The reported values for BWXT measurement of EKF in the 25%PF compacts are 7.39E-6 (measured fraction) and ≤1.48E-5 (95% confidence limit) and the ORNL values are consistent with these results. The BWXT values are lower than the values measured in the ORNL analysis but the difference in the measured EKF is well within the expected statistical sampling variation and the ORNL measured fraction is less than the BWXT reported 95% confidence limit.

Table 3-4. Defect Fractions in 25%PF compacts

	EKF	SDF
Number defects	1	3
Number particles	91720	91720
Measured fraction	1.09E-5	3.27E-5
95% Confidence limit	≤5.18E-5	≤8.46E-5

The uranium levels in the post-burn leaches of Clutches 5 and 6 indicate a total of 3 particles with defective SiC coatings according to the specified data analysis method in the AGR-5/6/7 fuel

specification. That equates to a measured fraction of 3.27E-5 and a 95% confidence value of ≤8.46E-5 (Table 3-4). This is less than the specified limit of SDF ≤1E-4 at 95% confidence. The reported values for BWXT measurement of SDF in the 25%PF compacts are 9.25E-5 (measured fraction) and ≤1.22E-4 (95% confidence limit). These values are higher than and appear to be marginally inconsistent with the ORNL results (the BWXT measured mean is slightly above the ORNL 95% confidence limit). As for the DUF comparison, further analysis of the individual leach results obtained by the BWXT analysis is needed to understand this apparent inconsistency.

3.2 LBL ANALYSIS FOR OTHER EXPOSED IMPURITIES IN 25%PF COMPACTS

Table 3-5 shows the results of the LBL impurity analysis for the impurities specified for compacts in the AGR-5/6/7 fuel specification [Marshall 2016]. Values are listed as the measured concentration in µg per compact. The values uncorrected by subtraction of the control blank and the minimum and maximum corrected values, as described in Section 2, are all provided, and the 95% confidence limit on the mean value is based on the maximum corrected data. Clutch to clutch variability was generally low, indicating that the impurities were fairly evenly distributed between the random clutches. The Group 4 transition metals were well below specified limits, except for iron, which was significantly above the specified limit of ≤25 µg/compact at 95% confidence. Calcium and aluminum were also significantly above the specified limit of ≤50 µg/compact at 95% confidence. Calcium and aluminum levels in the control blanks were elevated compared to the other measured impurities, but not enough to fully account for the high values in the compact clutch leachates.

Table 3-5. Impurities in 25%PF compacts not contained by intact SiC layers

Impurity	Uncorrected Mean	Minimum Corrected Mean	Maximum Corrected Mean	95% Confidence Limit
Fe	78.86 ± 4.73	77.29 ± 4.75	77.62 ± 4.75	≤83.21
Cr	<0.45 ± 0.06	0.16 ± 0.05	0.39 ± 0.06	≤0.46
Mn	<0.577 ± 0.029	0.522 ± 0.029	0.561 ± 0.029	≤0.60
Co	0.048 ± 0.005	0.041 ± 0.005	0.043 ± 0.005	≤0.05
Ni	<1.24 ± 0.26	0.56 ± 0.25	1.24 ± 0.26	≤1.55
Cr+Mn+Co+Ni	<2.32 ± 0.23	1.28 ± 0.20	2.24 ± 0.23	≤5.01
Ca	<138.38 ± 5.83	105.91 ± 5.85	135.21 ± 5.83	≤142.08
Al	173.16 ± 4.16	166.80 ± 4.16	166.80 ± 4.16	≤171.69
Ti	12.11 ± 2.85	11.54 ± 2.85	12.11 ± 2.85	≤15.46
V	5.46 ± 0.08	5.45 ± 0.08	5.46 ± 0.08	≤5.56
Ti + V	17.58 ± 2.87	16.99 ± 2.87	17.57 ± 2.87	≤20.95

The amount of each impurity detected by LBL is reported as the mean ± the standard deviation (in µg/compact) of the total measured in the four separate clutches in Group 1.
The 95% confidence limit is calculated with Student's t-distribution from the maximum corrected mean values.

4. COMPACTS WITH 40% PACKING FRACTION

Confirmatory LBL analysis was completed on 40 compacts from Batch J52R-16-14154C. These were 40% packing fraction compacts from a single BWXT furnace tray run. These 40 compacts were randomly sampled in clutches of 5 compacts each. The eight clutches were split into two groups of four clutches and each group was processed together with a blank sample. All leach solutions were analyzed for uranium contents and Group 2 leachates were also analyzed for other impurities (Fe, Cr, Mn, Co, Ni, Ca, Al, Ti, and V). Appendix B contains the official pre-burn leach and post-burn leach data report form (DRF) for each analyzed clutch of five compacts and inspection report forms (IRFs) that summarize the data. This data is further presented and discussed in the remainder of this section.

4.1 LBL ANALYSIS FOR EXPOSED URANIUM IN 40%PF COMPACTS

Table 4-1 shows uranium (in kernel-equivalents) in each solution collected during pre-burn leaching of the eight 40%PF compact clutches from Batch J52R-16-14154C. Also in the table are the individual pre-burn leach total U and DUF_{Pre} (if applicable) for each clutch. The water rinse data was only added to the total if it was >10% of the second leach and >1% of the average uranium per kernel, as noted in the table. Clutches displayed in bold had leached uranium ≥0.5 kernel-equivalents and therefore were counted as containing exposed-kernel defects. Only clutches without exposed-kernel defects were eligible for DUF measurement. Table 4-2 shows the same data for the post-burn leach. Table 4-3 and Table 4-4 summarize the defect fraction results.

Table 4-1. Uranium leached from 40%PF compacts before the burn

Clutch	1st Leach	2nd Leach	Water Rinse	Total	DUF $_{Pre}$
1	**1.95E+0**	**1.38E-1**	**3.03E-2**	**2.12**	---
2	**8.55E-1**	**1.89E+0**	**3.22E-1**	**3.07**	---
3	**1.82E+0**	**1.86E-1**	**3.79E-2**	**2.04**	---
4	**2.47E+0**	**2.43E-1**	**2.79E-2**	**2.75**	---
5	2.76E-2	5.73E-3	---	0.03	1.91E-6
6	3.87E-2	6.84E-3	---	0.05	2.62E-6
7	**9.33E-1**	**1.52E-1**	---	**1.09**	**---**
8	2.60E-2	6.36E-3	---	0.03	1.86E-6

Uranium content in each leach is reported in kernel-equivalents; individual DUF_{Pre} is the pre-burn leach fraction of exposed uranium in each clutch with <0.5 exposed kernel-equivalents; and the water rinse was not added to the total if shaded gray.

Table 4-2. Uranium leached from 40%PF compacts after the burn

Clutch	1st Leach	2nd Leach	Water Rinse	Total	DUF $_{Post}$
1	**1.03E+0**	**8.35E-3**	**1.38E-4**	**1.04**	---
2	8.10E-2	5.14E-3	2.10E-4	0.09	4.95E-6
3	**8.27E-1**	**1.23E-2**	**2.44E-4**	**0.84**	---
4	**7.23E-1**	**3.17E-1**	**3.70E-3**	**1.04**	---
5	3.70E-2	7.26E-4	8.88E-5	0.04	2.17E-6
6	3.14E-2	7.58E-4	1.50E-4	0.03	1.85E-6
7	**1.06E+0**	**8.41E-3**	**1.60E-4**	**1.07**	---
8	3.47E-2	6.62E-4	2.03E-4	0.04	2.03E-6

Uranium content in each leach is reported in kernel-equivalents; individual DUF_{Post} is the post-burn leach fraction of exposed uranium in each clutch with <0.5 exposed kernel-equivalents; and the water rinse was not added to the total if shaded gray.

Dispersed uranium values were fairly consistent in the pre-burn and post-burn clutches that did not contain a defective particle, with the exception of Clutch 2. Clutch 2 had elevated levels of uranium detected in the post-burn leach series and previous observations have shown that this was likely related to

the presence of the exposed-kernel defects detected in the pre-burn leach series. During defective IPyC analysis of the coating batches used in the AGR-5/6/7 coated particle composite Lot J52R-16-98005, particles were heated to simulate the 1800°C heat treatment during compacting and subsequently examined with x-ray tomography [Helmreich et al. 2017b]. Particles with impact-cracked TRISO layers (exposed-kernel defects) exhibited significant reaction between the uranium in the kernel and the surrounding carbon layers. Presumably, uranium can also migrate out of exposed-kernel defects into the surrounding graphite and carbonized resin in a compact. This dispersed uranium may become sequestered within the graphite structure where the acid cannot effectively penetrate or be in a less soluble chemical form until after the burn phase. Throughout the AGR development and qualification campaign, it has been observed that compacts containing particles with exposed-kernel defects exhibit elevated uranium levels in the first post-burn leach. Because the contamination detected in the Clutch 2 post-burn leaches may be in the form of dispersed uranium even though its original source was particles with exposed-kernel defects, it should be included in the final DUF results. However, for comparative information, Table 4-3 also shows the combined DUF values with Clutch 2 post-burn leaches excluded.

Table 4-3. Dispersed uranium in 40%PF compacts

		DUF_{Pre}	DUF_{Post}	DUF_{Total}
All 40 compacts	Mean	2.13E-6	2.75E-6	4.88E-6
	Standard deviation	4.22E-7	1.47E-6	
	95% Confidence limit	≤2.85E-6	≤4.49E-6	≤6.88E-6
Excluding Clutch 2	Mean	2.13E-6	2.02E-6	4.15E-6
	Standard deviation	4.22E-7	1.59E-7	
	95% Confidence limit	≤2.85E-6	≤2.29E-6	≤4.97E-6

The DUF values measured in the ORNL analysis indicate that the 40%PF compact batch DUF_{Total} was below the specified limit of DUF_{Total} ≤1E-5 at 95% confidence. The reported values [Marshall 2017] for BWXT measurement of DUF_{Total} in the 40%PF compacts are 3.18E-5 (measured-sample mean) and ≤3.80E-5 (95% confidence limit on mean). These values are considerably higher than and appear to be inconsistent with the ORNL results.

There appeared to be a total of 11 exposed-kernel defects in the pre-burn leach material, but 10 of these were found in the first group (Table 4-1), which suggests the possibility of an erroneously high defect fraction due to some artifact of the LBL analysis. The probability of the observed distribution occurring if the exposed-kernel defects were all present in the over-coated particle composite is extremely low. With thousands of over-coated particles in each compact, defects in the over-coated particle composite should be much more evenly distributed between the compacts. If the compacting process was the major contributor to the high exposed-kernel defect count, then the sampling size is much smaller (20 compacts per group rather than ~70,000 particles) and the probability of the observed distribution is higher but still unlikely (roughly <10% based on a simplified probability estimate). Additional groups of compacts would have to be analyzed to determine if the Group 1 data is an artifact of the LBL analysis or an indicator of damage introduced by the compacting process. It is estimated that one or two more groups of 20 compacts with defect fractions similar to Group 2 would allow the Group 1 data to be discarded with good confidence.

The possibility for defects being introduced during LBL analysis is usually low. However, the AGR-5/6/7 LBL analysis proved to be much more difficult than previous LBL analysis of AGR compacts made with a different graphite/resin blend. The AGR-5/6/7 matrix appeared to contain much finer particles of graphite and this resulted in a very viscous suspension in the acid that complicated the separation of the coated particles from the leach acid and increased the centrifuge time required to extract a suitable sample for mass spectrometry. It may be that the Group 1 data, being the first set of AGR-5/6/7 compacts analyzed, was the victim of a learning curve.

Table 4-4 shows the defect fraction results for all 40 compacts and for just the 20 compacts in Group 2. The combined results of the analysis are above the specified limit of EKF ≤5E-5 at 95% confidence. The Group 2 data by itself is also slightly above the specified limit of EKF ≤5E-5 at 95% confidence, but the measured data indicates that analysis of additional compacts (if they are similar to Group 2 in EKF) would reduce the statistical penalty in the binomial distribution calculation of the 95% confidence limit and result in a value below the specified limit. The reported values for BWXT measurement of EKF in the 40%PF compacts are 6.57E-5 (measured fraction) and ≤9.28E-5 (95% confidence limit). These results are similar to the combined ORNL results for all 40 compacts but inconsistent with the ORNL results for Group 2 by itself. This could suggest that the low results for Group 2 were simply a statistically unlikely result of the random division of the 40 compacts into clutches. However, if additional groups of 40%PF compacts exhibit defect fractions similar to Group 2, then perhaps the values observed in the BWXT analysis were impacted by the difficulties in processing these samples, as appears to be the case for the ORNL Group 1 data.

Table 4-4. Defect fractions in 40%PF compacts

		EKF	SDF
All 40 compacts	Number defects	11	4
	Number particles	139,160	139,160
	Measured fraction	7.90E-5	2.87E-5
	95% Confidence limit	≤1.31E-4	≤6.58E-5
Excluding Group 1	Number defects	1	1
	Number particles	69,580	69,580
	Measured fraction	1.44E-5	1.44E-5
	95% Confidence limit	≤6.82E-5	≤6.82E-5

It is not clear whether LBL analysis difficulties may have also impacted the determination of the SDF in the post-burn leaching. There were more post-burn leach kernel-equivalents in Group 1 than Group 2, and there is also a suggestion of a correlation between the presence of pre-burn leach defects and post-burn leach defects that introduces a whole new complication to the analysis. However, the calculated 95% confidence limits with and without Group 1 data included are almost the same and both are below the specified limit of SDF ≤1E-4 at 95% confidence. The reported values for BWXT measurement of SDF in the 40%PF compacts are 6.96E-5 (measured fraction) and ≤9.66E-5 (95% confidence limit). These values are higher than and appear to be marginally inconsistent with the ORNL results (the BWXT measured mean is slightly above the ORNL 95% confidence limit). Similar to the SDF analysis for the 25%PF compacts, further analysis of the individual leach results obtained by the BWXT analysis is needed to understand this possible inconsistency.

4.2 LBL ANALYSIS FOR OTHER EXPOSED IMPURITIES IN 40%PF COMPACTS

Table 4-5 shows the results of the LBL impurity analysis for the impurities specified for compacts in the AGR-5/6/7 fuel specification [Marshall 2016]. Values are listed as the measured concentration in µg per compact. The values uncorrected by subtraction of the control blank and the minimum and maximum corrected values, as described in Section 2, are all provided, and the 95% confidence limit on the mean value is based on the maximum corrected data. Results were similar to the 25%PF compacts (Table 3-5). Clutch to clutch variability was generally low, indicating that the impurities were fairly evenly distributed between the random clutches. The Group 4 transition metals were well below specified limits, except for iron, which was significantly above the specified limit of ≤25 µg/compact at 95% confidence. Calcium and aluminum were also significantly above the specified limit of ≤50 µg/compact at 95% confidence. Calcium and aluminum levels in the control blanks were elevated compared to the other measured impurities, but not enough to fully account for the high values in the compact clutch leachates. The relative calcium and aluminum impurity levels between the two different packing fractions is consistent

with the relative fraction of matrix material, which provides additional indication that the values are not artifacts and suggests that the matrix could be the dominant source of these impurities.

Table 4-5. Impurities in 40%PF compacts not contained by intact SiC layers

Impurity	Uncorrected Mean	Minimum Corrected Mean	Maximum Corrected Mean	95% Confidence Limit
Fe	<51.23 ± 5.11	46.03 ± 5.09	48.16 ± 5.11	≤54.17
Cr	<0.73 ± 0.22	0.56 ± 0.22	0.65 ± 0.22	≤0.91
Mn	<0.414 ± 0.013	0.327 ± 0.012	0.345 ± 0.013	≤0.36
Co	<0.029 ± 0.004	0.017 ± 0.004	0.021 ± 0.004	≤0.03
Ni	<1.64 ± 0.46	0.94 ± 0.46	1.64 ± 0.46	≤2.18
Cr+Mn+Co+Ni	<2.81 ± 0.49	1.85 ± 0.49	2.65 ± 0.49	≤8.63
Ca	116.63 ± 8.38	96.76 ± 8.38	114.27 ± 8.38	≤124.14
Al	138.65 ± 4.33	133.95 ± 4.33	133.95 ± 4.33	≤139.05
Ti	9.66 ± 0.41	9.31 ± 0.41	9.66 ± 0.41	≤10.15
V	5.54 ± 0.08	5.51 ± 0.08	5.54 ± 0.08	≤5.63
Ti + V	15.20 ± 0.49	14.82 ± 0.49	15.20 ± 0.49	≤15.78

The amount of each impurity detected by LBL is reported as the mean ± the standard deviation (in µg/compact) of the total measured in the four separate clutches in Group 2.
The 95% confidence limit is calculated with Student's t-distribution from the maximum corrected mean values.

5. OVERCOATED PARTICLES

Supplementary LBL analysis was completed on over-coated particles taken from Batch J52R-16-11034 (used for the 40%PF compacts). These over-coated particles were randomly riffled by a gentle cone and quartering method with emphasis on avoiding damage from handling prior to analysis. Eight "clutches" were created with approximately the same number of particles per clutch as in the five-compact clutches used in the 40%PF compact LBL analysis. Ten sub-samples were also riffled for measurement of average over-coated particle weight according to the procedure in AGR-CHAR-DAM-22. Particle number was determined by weighing the clutches and dividing by the average weight per over-coated particle. The eight clutches were split into two groups of four clutches and LBL performed on each group together with a blank sample. All leach solutions were analyzed for uranium content only. Appendix C contains the official pre-burn leach and post-burn leach data report form (DRF) for each analyzed clutch and inspection report forms (IRFs) that summarize the data. This data is further presented and discussed in the remainder of this section.

5.1 LBL ANALYSIS FOR EXPOSED URANIUM IN OVER-COATED PARTICLES

Table 5-1 shows uranium (in kernel-equivalents) in each solution collected during pre-burn leaching of the eight over-coated particle clutches from Batch J52R-16-11034. Also in the table are the individual pre-burn leach total U and DUF_{Pre} (if applicable) for each clutch. The water rinse data was only added to the total if it was >10% of the second leach and >1% of the average uranium per kernel, as noted in the table. Clutches displayed in bold had leached uranium >0.5 kernel-equivalents and therefore were counted as containing exposed-kernel defects. Only clutches without exposed-kernel defects were eligible for DUF measurement. Table 5-2 shows the same data for the post-burn leach. Table 5-3 and Table 5-4 summarize the defect fraction results.

Table 5-1. Uranium leached from over-coated particles before the burn

Clutch	1st Leach	2nd Leach	Water Rinse	Total	DUF_{Pre}
1	7.92E-2	1.05E-2	6.36E-4	0.09	5.09E-6
2	8.03E-2	1.61E-2	9.27E-4	0.10	5.18E-6
3	8.06E-2	1.10E-2	7.25E-4	0.09	5.10E-6
4	7.88E-2	1.85E-2	9.78E-4	0.10	5.46E-6
5	**2.64E+0**	**4.48E-1**		**3.09**	---
6	7.92E-2	9.51E-2		0.17	9.31E-6
7	9.21E-2	1.94E-2		0.11	6.30E-6
8	**3.53E+0**	**5.98E-2**		**3.59**	---

Uranium content in each leach is reported in kernel-equivalents; individual DUF_{Pre} is the pre-burn leach fraction of exposed uranium in each clutch with <0.5 exposed kernel-equivalents; and the water rinse was not added to the total if shaded gray.

Table 5-2. Uranium leached from over-coated particles after the burn

Clutch	1st Leach	2nd Leach	Water Rinse	Total	DUF_{Post}
1	2.38E-3	1.34E-3		0.004	2.11E-7
2	2.58E-3	3.56E-4		0.003	1.58E-7
3	3.01E-3	5.52E-4		0.004	1.98E-7
4	**1.23E+0**	**3.47E-3**		**1.234**	---
5	1.46E-1	2.09E-3		0.149	7.48E-6
6	6.61E-3	9.98E-2		0.106	5.69E-6
7	6.13E-3	2.77E-4		0.006	3.62E-7
8	1.38E-2	4.13E-4		0.014	7.51E-7

Uranium content in each leach is reported in kernel-equivalents; individual DUF_{Post} is the post-burn leach fraction of exposed uranium in each clutch with <0.5 exposed kernel-equivalents; and the water rinse was not added to the total if shaded gray.

Dispersed uranium values were fairly consistent in the pre-burn and post-burn clutches that did not contain a defective particle, with the exception of Clutches 5, 6, and 8. Clutch 6 had elevated levels of uranium detected in both the pre-burn and post-burn leach series similar to that observed in Clutch 3 of the 25%PF compact sample (Table 3-1). This could be due to localized uranium contamination (possibly in a single particle). Such localized uranium contamination was observed in the x-ray imaging during defective IPyC analysis of the coating batches used in the AGR-5/6/7 coated particle composite [Helmreich et al. 2017b]. Clutches 5 and 8 had elevated levels of uranium detected in the post-burn leach series presumably related to the exposed-kernel defects detected in the pre-burn leach series, as discussed in Section 4.1 with regard to Clutch 3 of the 40%PF compact sample (Table 4-1). In conjunction with the unlikely high exposed-kernel count in Clutches 5 and 8, there is a strong case for rejection of the second group of clutches due to suspect artifacts from the LBL analysis; this is discussed further below. For comparative information, Table 5-3 shows the combined DUF values for all clutches and for just the first four clutches analyzed in the first group. Excluding Group 2 makes a significant difference in the measured mean and standard deviation. The impact is less significant in the 95% confidence limit only because of the reduced sample size.

The reported value [Marshall 2017] for BWXT measurement of the mean DUF_{Total} in the coated particle composite Lot J52R-16-98005 is 2.28E-5 (measured mean). This value is considerably higher than either DUF_{Total} value calculated from the ORNL data and reported in Table 5-3 and appears to be inconsistent with the ORNL results.

Table 5-3. Dispersed uranium in over-coated particles

		DUF_{Pre}	DUF_{Post}	DUF_{Total}
All 8 clutches	Mean	6.07E-6	2.12E-6	8.19E-6
	Standard deviation	1.65E-6	3.10E-6	
	95% Confidence limit	≤7.43E-6	≤4.40E-6	≤1.09E-5
Excluding Group 2	Mean	5.20E-6	1.89E-7	5.39E-6
	Standard deviation	1.73E-7	2.78E-8	
	95% Confidence limit	≤5.41E-6	≤2.37E-7	≤5.62E-6

There appeared to be a total of six or seven exposed-kernel defects in the pre-burn leach material, six after subtraction of the mean DUF in the pre-burn leach and rounding to the nearest whole number as instructed by the AGR-5/6/7 fuel specification. However, the apparent exposed-kernel defects were found clustered in just two clutches in the second group (Table 5-1), which suggests the possibility of an erroneously high defect fraction due to some artifact of the LBL analysis. The probability of six exposed-kernel defects being clustered this way is less than 1%. It is conjectured that erroneous data may have resulted from the combination of the challenge of working with the AGR-5/6/7 graphite/resin over-coating material, which produces a viscous suspension in the leach acid that was difficult to separate from the TRISO particles, combined with the fact that Group 2 analysis was done by less experienced personnel. As for the 40% compact analysis, additional LBL on another sample of over-coated particles is recommended for firmly establishing the hypothesis that the Group 2 data should be rejected and the Group 1 data is representative of the actual batch properties.

Table 5-4 presents the EKF and SDF values based on all eight clutches versus only the first four clutches analyzed together in the first group. The measured EKF is significantly lower when the Group 2 data is deleted, but the 95% confidence limit is still relatively high because of the small sample size. This high statistical uncertainty in the batch EKF makes comparison to the BWXT particle and compact data of limited value. The combined results of the LBL analysis for exposed kernels before the burn are above the specified limit of EKF ≤5E-5 at 95% confidence, while the Group 1 data by itself is below the specified limit, even with the higher statistical penalty in calculating the 95% confidence limit for a smaller sample.

Table 5-4. Defect fractions in over-coated particles

		EKF	SDF
All 8 clutches	Number defects	6	1
	Number particles	147,270	147,270
	Measured fraction	4.07E-5	6.79E-6
	95% Confidence limit	≤8.05E-5	≤3.23E-5
Excluding Group 2	Number defects	0	1
	Number particles	72,039	72,039
	Measured fraction	0	1.39E-5
	95% Confidence limit	≤4.16E-5	≤6.59E-5

Excluding Group 2 is probably not necessary in the consideration of the SDF as no defective SiC particles were introduced by the presumed analysis issues related to that group, and it is helpful to include the Group 1 data in the SDF determination to reduce the statistical penalty in calculating the 95% confidence limit. The measured fraction of 6.79E-6 and 95% confidence limit of ≤3.23E-5 is consistent with the BWXT measured values for the 98005 TRISO composite of 2.83E-5 (measured fraction) and ≤3.27E-5 (95% confidence limit). The SDF values for the over-coated particle batch are also consistent with the ORNL values from the 40%PF compact analysis (Table 4-4).

6. CONCLUSION

Confirmatory LBL analyses of 40 compacts from 25%PF and 40%PF AGR-5/6/7 compact batches were completed at ORNL and compared to the BWXT LBL results. The amount of uranium leached from the deconsolidated particles and compact matrix residue during the pre-burn leach and post-burn leach phases was used to calculate the EKF, SDF, and DUF. The limited sample size and difficulties with the LBL analysis itself complicated the comparison, but some trends were apparent. Supplemental analysis of a sample of the over-coated particle used for the 40%PF compacts was also measured.

The DUF_{Total} measured by ORNL was lower than that measured by BWXT for both compact samples and for the over-coated particles (in comparison to BWXT data for the TRISO particle composite). The ORNL data indicate that the AGR-5/6/7 material has a DUF_{Total} below the AGR-5/6/7 specified limit of $DUF_{Total} \leq$1E-5 at 95% confidence. Reasons for the inconsistency between the two laboratories may become apparent if further analysis of the individual leach results obtained by BWXT is performed. Initial review of the BWXT leaching results (not discussed in this report) shows that numerous leaches yielded results in the range of 0.1–0.3 kernel-equivalents. This could be related to what was observed in Clutch 3 of the ORNL 25%PF sample and Clutch 6 of the over-coated particle sample, which indicated that there was non-uniformly dispersed, abnormally-high uranium contamination in those clutches. Such localized uranium contamination was also observed in the x-ray imaging during defective IPyC analysis of the coating batches used in the AGR-5/6/7 coated particle composite [Helmreich et al. 2017b]. A second explanation for the numerous BWXT data points in the range of 0.1–0.3 kernel-equivalents may be particle damage and incomplete leaching during the LBL process as a result of the same difficulty experienced by ORNL in separating the leachate from the particles and matrix debris. Some of the BWXT leach results indicate detection of more exposed uranium in the second leach than in the first, which seems to indicate that particle damage and/or incomplete leaching was occurring.

Excluding clutches that had abnormally-high DUF because of what appeared to be contributions from either localized uranium contamination (e.g., 25%PF Clutch 3) or residual uranium in the post-burn leach from exposed-kernel defects (e.g., 40%PF Cutch 2) yielded well-defined and similar DUF_{Total} values of 5.14E-6 (measured mean) and ≤6.31E-6 (95% confidence limit) for 25%PF compacts, versus 4.15E-6 (measured mean) and ≤4.97E-6 (95% confidence limit) for 40%PF compacts. These compact DUF_{Total} values matched up well with that for over-coated particle Group 1 of 5.39E-6 (measured mean) and ≤5.62E-6 (95% confidence limit), suggesting the source of this overall dispersed uranium contamination is in the TRISO particles. Including the data presumably impacted by localized contamination in the particle coatings or the presence of exposed kernel defects causes these filtered values to increase significantly. However, how the abnormal clutches should be pooled with the more normally-distributed results should be examined, as the Students t-test may not be the proper approach.

Pre-burn leaching of the AGR-5/6/7 compacts and over-coated particles was complicated by the fact that the AGR-5/6/7 matrix material contains graphite and carbon fines that produce a viscous suspension in the pre-burn leach acid. This made it much more difficult to transfer the acid into the centrifuge tubes while trying to leave the particles in the vessel used for leaching and burning. It also made it harder to separate the liquid from the suspended fines and harder to transfer the fines back into the vessel after the leachate was removed. Earlier AGR compacts for which the current procedure was developed did not produce the same problem, and some modifications to the LBL procedure are recommended for working with the AGR-5/6/7 samples. Whether or not the 40%PF compacts may satisfy the fuel specification limits on the EKF depends on whether some of the observed results are artifacts of the problems in handling the LBL samples. Measurement of additional samples could help with this determination, given that there is some indication that familiarity with the processing difficulties reduced their impact on the results.

Inclusion of the 40%PF Group 1 clutches results in a measured EKF of 7.90E-5, which is sufficient to fail the compact batch (Table 4-4). Exclusion of the Group 1 clutches results in a lower measured fraction of 1.44E-5 but insufficient sample size to determine that the 40%PF compact batch has less than the allowable limit of EKF ≤5E-5 at 95% confidence. The EKF results from the 25%PF compacts did not appear to be impacted by the handling difficulties and there was only one clutch identified to contain an exposed-kernel defect, yielding a measured fraction of 1.09E-5 and a 95% confidence limit of ≤5.18E-5 (Table 3-4). This is slightly above the specified limit of EKF ≤5E-5 at 95% confidence but the measured data indicate that analysis of additional compacts to reduce the statistical penalty in the binomial distribution calculation of the 95% confidence limit would result in a value below the specified limit. For the over-coated particles, the EKF value is again dependent on whether some of the results were an artifact of the LBL process.

The SDF determination did not appear to be affected by the problems associated with the pre-burn leach analysis. Similar results were obtained from the 25%PF and 40%PF samples, The 25%PF compact sample yielded a measured fraction of 3.27E-5 and a 95% confidence value of ≤8.46E-5 (Table 3-4); and the 40%PF sample yielded a measured fraction of 2.87E-5 and a 95% confidence value of ≤6.58E-5 (Table 4-4). The over-coated particle results were a little lower with a measured fraction of 6.79E-6 and a 95% confidence value of ≤3.23E-5. All these results were consistent with a conclusion that the SDF is a function of defects in the coated particle lot, rather than defects introduced during compacting.

7. REFERENCES

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APPENDIX A. Report Forms for 25% Packing Fraction Compacts

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

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction

Compact ID numbers:	1225, 1287, 1303, 1802, 1829	1227, 1241, 1264, 1819, 1831	1223, 1309, 1319, 1800, 1805	1221, 1240, 1243, 1266, 1316	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Pre-burn leach (DRF-26A) (µg):	170.56	160.90	177.34	160.64		
Post-burn leach (DRF-26B) (µg):	230.44	254.08	193.39	205.11		
Total leached (µg):	401.00	414.98	370.72	365.75		
Fe outside SiC (µg/compact):	**80.20**	**83.00**	**74.14**	**73.15**	**77.62**	**4.75**
Chromium						
Pre-burn leach (DRF-26A) (µg):	1.88	1.69	1.95	1.50		
Post-burn leach (DRF-26B) (µg):	0.36	0.15	0.17	0.14		
Total leached (µg):	2.25	1.84	2.13	1.64		
Cr outside SiC (µg/compact):	**0.45**	**0.37**	**0.43**	**0.33**	**0.39**	**0.06**
Manganese						
Pre-burn leach (DRF-26A) (µg):	2.86	2.58	2.66	2.48		
Post-burn leach (DRF-26B) (µg):	0.14	0.17	0.16	0.17		
Total leached (µg):	3.00	2.75	2.81	2.65		
Mn outside SiC (µg/compact):	**0.60**	**0.55**	**0.56**	**0.53**	**0.561**	**0.029**
Cobalt						
Pre-burn leach (DRF-26A) (µg):	0.06	0.05	0.06	0.08		
Post-burn leach (DRF-26B) (µg):	0.18	0.17	0.12	0.13		
Total leached (µg):	0.24	0.22	0.18	0.21		
Co outside SiC (µg/compact):	**0.048**	**0.044**	**0.036**	**0.042**	**0.043**	**0.005**
Nickel						
Pre-burn leach (DRF-26A) (µg):	2.89	2.41	2.69	3.44		
Post-burn leach (DRF-26B) (µg):	2.36	2.56	4.27	4.21		
Total leached (µg):	5.25	4.98	6.96	7.65		
Ni outside SiC (µg/compact):	**1.05**	**1.00**	**1.39**	**1.53**	**1.24**	**0.26**
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):	**2.15**	**1.96**	**2.42**	**2.43**	**2.24**	**0.23**
Calcium						
Pre-burn leach (DRF-26A) (µg):	622.90	574.91	628.06	641.30		
Post-burn leach (DRF-26B) (µg):	47.26	67.76	49.95	72.16		
Total leached (µg):	670.16	642.67	678.01	713.46		
Ca outside SiC (µg/compact):	**134.03**	**128.53**	**135.60**	**142.69**	**135.21**	**5.83**
Aluminum						
Pre-burn leach (DRF-26A) (µg):	794.67	744.73	783.94	773.60		
Post-burn leach (DRF-26B) (µg):	29.36	85.65	33.55	90.58		
Total leached (µg):	824.03	830.37	817.49	864.17		
Al outside SiC (µg/compact):	**164.81**	**166.07**	**163.50**	**172.83**	**166.80**	**4.16**
Titanium						
Pre-burn leach (DRF-26A) (µg):	33.92	34.63	57.64	24.62		
Post-burn leach (DRF-26B) (µg):	16.44	27.25	22.57	25.17		
Total leached (µg):	50.36	61.88	80.22	49.79		
Ti outside SiC (µg/compact):	**10.07**	**12.38**	**16.04**	**9.96**	**12.11**	**2.85**
Vanadium						
Pre-burn leach (DRF-26A) (µg):	20.98	19.60	21.10	19.60		
Post-burn leach (DRF-26B) (µg):	6.74	7.72	6.32	7.16		
Total leached (µg):	27.72	27.31	27.42	26.76		
V outside SiC (µg/compact):	**5.54**	**5.46**	**5.48**	**5.35**	**5.46**	**0.08**
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):	**15.62**	**17.84**	**21.53**	**15.31**	**17.57**	**2.87**

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-C: Summary of Pre-burn Leach Uranium

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction

Compact ID numbers:	1225, 1287, 1303, 1802, 1829	1227, 1241, 1264, 1819, 1831	1223, 1309, 1319, 1800, 1805	1221, 1240, 1243, 1266, 1316	Total
Number of compacts:	5	5	5	5	20
Equivalent number of leached kernels:	4.3E-02	3.5E-02	2.2E-01	7.6E-02	3.7E-01

Comments

2/05/2018 Pre-burn data has been verified

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-C: Summary of Pre-burn Leach Uranium

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction

Compact ID numbers:	1233, 1254, 1287, 1291, 1821	1236, 1305, 1321, 1807, 1808	1257, 1258, 1285, 1298, 1324	1277, 1279, 1314, 1812, 1828	Total
Number of compacts:	5	5	5	5	20
Equivalent number of leached kernels:	4.6E-02	9.5E-01	3.1E-02	3.7E-02	1.1E+00

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-D: Summary of Post-Burn Leach Uranium

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction

Compact ID numbers:	1225, 1287, 1303, 1802, 1829	1227, 1241, 1264, 1819, 1831	1223, 1309, 1319, 1800, 1805	1221, 1240, 1243, 1266, 1316	Total
Number of compacts:	5	5	5	5	20
Equivalent number of leached kernels:	1.3E-02	1.4E-02	1.3E-01	1.3E-02	1.7E-01

Comments

2/07/2018 Post-burn data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-D: Summary of Post-Burn Leach Uranium

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction

Compact ID numbers:	1233, 1254, 1287, 1291, 1821	1236, 1305, 1321, 1807, 1808	1257, 1258, 1285, 1298, 1324	1277, 1279, 1314, 1812, 1828	Total
Number of compacts:	5	5	5	5	20
Equivalent number of leached kernels:	1.2E+00	2.2E+00	1.5E-02	1.6E-02	3.4E+00

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1225, 1287, 1303, 1802, 1829
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17121401	L17121901		W17121901	
	Total volume of leach solution (ml):	156.0	192.0		182.0	
	Radiochemical laboratory analysis number:	17908-001	17908-006		171908-011	
	Measured uranium concentration (µg/ml):	9.25E-02	1.39E-02		1.42E-03	
	Uncertainty in uranium concentration (µg/ml):	9.25E-03	1.39E-03		1.42E-04	
	Weight uranium leached (g):	1.44E-05	2.67E-06	1.71E-05	2.58E-07	N
	Uncertainty in weight uranium leached (g):	1.44E-06	2.67E-07	1.47E-06	2.59E-08	
	Equivalent number of leached kernels:	3.66E-02	6.77E-03	4.34E-02	6.56E-04	
	Uncertainty in equivalent number of leached kernels:	3.68E-03	6.81E-04	3.75E-03	6.60E-05	
Fe	Measured concentration of impurity in sample (µg/ml):	8.79E-01	1.72E-01	Fe	2.59E-02	
	Uncorrected weight of impurity in sample (µg):	137.12	33.02	174.86	4.71	Y
	Weight of impurity in blank (µg):	3.41	< 1.67		0.89	
	Minimum corrected weight of impurity in sample (µg):	133.71	31.35	168.88	3.82	
	Maximum corrected weight of impurity in sample (µg):	133.71	33.02	170.56	3.82	
Cr	Measured concentration of impurity in sample (µg/ml):	7.57E-03	3.66E-03	Cr	< 2.91E-03	
	Uncorrected weight of impurity in sample (µg):	1.18	0.70	1.88	< 0.53	N
	Weight of impurity in blank (µg):	< 0.57	< 0.57		< 0.15	
	Minimum corrected weight of impurity in sample (µg):	0.61	0.13	0.74	0.00	
	Maximum corrected weight of impurity in sample (µg):	1.18	0.70	1.88	0.53	
Mn	Measured concentration of impurity in sample (µg/ml):	1.42E-02	3.08E-03	Mn	5.83E-04	
	Uncorrected weight of impurity in sample (µg):	2.22	0.59	2.91	0.11	Y
	Weight of impurity in blank (µg):	< 0.10	< 0.10		0.05	
	Minimum corrected weight of impurity in sample (µg):	2.12	0.49	2.67	0.06	
	Maximum corrected weight of impurity in sample (µg):	2.22	0.59	2.86	0.06	
Co	Measured concentration of impurity in sample (µg/ml):	4.16E-04	7.16E-05	Co	< 3.52E-05	
	Uncorrected weight of impurity in sample (µg):	0.06	0.01	0.08	< 0.01	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.05	0.01	0.05	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.05	0.01	0.06	0.01	
Ni	Measured concentration of impurity in sample (µg/ml):	9.42E-03	< 7.40E-03	Ni	< 7.40E-03	
	Uncorrected weight of impurity in sample (µg):	1.47	< 1.42	< 2.89	< 1.35	N
	Weight of impurity in blank (µg):	< 1.45	< 1.45		< 0.38	
	Minimum corrected weight of impurity in sample (µg):	0.02	0.00	0.02	0.00	
	Maximum corrected weight of impurity in sample (µg):	1.47	1.42	2.89	1.35	
Ca	Measured concentration of impurity in sample (µg/ml):	3.22E+00	6.28E-01	Ca	< 3.33E-01	
	Uncorrected weight of impurity in sample (µg):	502.32	120.58	622.90	<60.61	N
	Weight of impurity in blank (µg):	<65.27	<65.27		<17.32	
	Minimum corrected weight of impurity in sample (µg):	437.05	55.31	492.36	0.00	
	Maximum corrected weight of impurity in sample (µg):	502.32	120.58	622.90	60.61	
Al	Measured concentration of impurity in sample (µg/ml):	4.13E+00	7.67E-01	Al	1.09E-01	
	Uncorrected weight of impurity in sample (µg):	644.28	147.26	811.38	19.84	Y
	Weight of impurity in blank (µg):	7.70	3.94		5.07	
	Minimum corrected weight of impurity in sample (µg):	636.58	143.32	794.67	14.77	
	Maximum corrected weight of impurity in sample (µg):	636.58	143.32	794.67	14.77	
Ti	Measured concentration of impurity in sample (µg/ml):	9.25E-02	6.34E-02	Ti	4.02E-02	
	Uncorrected weight of impurity in sample (µg):	14.43	12.17	33.92	7.32	Y
	Weight of impurity in blank (µg):	< 1.04	< 1.04		< 0.28	
	Minimum corrected weight of impurity in sample (µg):	13.39	11.14	31.57	7.04	
	Maximum corrected weight of impurity in sample (µg):	14.43	12.17	33.92	7.32	
V	Measured concentration of impurity in sample (µg/ml):	1.01E-01	2.28E-02	V	4.66E-03	
	Uncorrected weight of impurity in sample (µg):	15.76	4.38	20.98	0.85	Y
	Weight of impurity in blank (µg):	< 0.03	< 0.03		< 0.01	
	Minimum corrected weight of impurity in sample (µg):	15.73	4.35	20.92	0.84	
	Maximum corrected weight of impurity in sample (µg):	15.76	4.38	20.98	0.85	

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17908 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1227, 1241, 1264, 1819, 1831
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17121402	L17121902		W17121902	
Total volume of leach solution (ml):		144.0	182.0		116.0	
Radiochemical laboratory analysis number:		17908-002	17908-007		17908-012	
Measured uranium concentration (µg/ml):		7.94E-02	1.30E-02		2.10E-03	
Uncertainty in uranium concentration (µg/ml):		7.94E-03	1.30E-03		2.10E-04	
Weight uranium leached (g):		1.14E-05	2.37E-06	1.38E-05	2.44E-07	N
Uncertainty in weight uranium leached (g):		1.14E-06	2.37E-07	1.17E-06	2.44E-08	
Equivalent number of leached kernels:		2.90E-02	6.01E-03	3.50E-02	6.18E-04	
Uncertainty in equivalent number of leached kernels:		2.92E-03	6.04E-04	2.99E-03	6.22E-05	
Fe	Measured concentration of impurity in sample (µg/ml):	9.01E-01	1.74E-01	**Fe**	3.27E-02	
	Uncorrected weight of impurity in sample (µg):	129.74	31.67	165.21	3.79	Y
	Weight of impurity in blank (µg):	3.41	< 1.67		0.89	
	Minimum corrected weight of impurity in sample (µg):	126.33	29.99	159.23	2.90	
	Maximum corrected weight of impurity in sample (µg):	126.33	31.67	160.90	2.90	
Cr	Measured concentration of impurity in sample (µg/ml):	7.30E-03	3.51E-03	**Cr**	< 2.91E-03	
	Uncorrected weight of impurity in sample (µg):	1.05	0.64	1.69	< 0.34	N
	Weight of impurity in blank (µg):	< 0.57	< 0.57		< 0.15	
	Minimum corrected weight of impurity in sample (µg):	0.48	0.07	0.55	0.00	
	Maximum corrected weight of impurity in sample (µg):	1.05	0.64	1.69	0.34	
Mn	Measured concentration of impurity in sample (µg/ml):	1.47E-02	2.55E-03	**Mn**	< 4.92E-04	
	Uncorrected weight of impurity in sample (µg):	2.12	0.46	2.58	< 0.06	N
	Weight of impurity in blank (µg):	< 0.10	< 0.10		0.05	
	Minimum corrected weight of impurity in sample (µg):	2.02	0.37	2.39	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.12	0.46	2.58	0.01	
Co	Measured concentration of impurity in sample (µg/ml):	3.91E-04	6.52E-05	**Co**	< 3.52E-05	
	Uncorrected weight of impurity in sample (µg):	0.06	0.01	0.07	< 0.00	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.04	0.00	0.04	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.04	0.01	0.05	0.00	
Ni	Measured concentration of impurity in sample (µg/ml):	< 7.40E-03	< 7.40E-03	**Ni**	< 7.40E-03	
	Uncorrected weight of impurity in sample (µg):	< 1.07	< 1.35	< 2.41	< 0.86	N
	Weight of impurity in blank (µg):	< 1.45	< 1.45		< 0.38	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00	0.00	
	Maximum corrected weight of impurity in sample (µg):	1.07	1.35	2.41	0.86	
Ca	Measured concentration of impurity in sample (µg/ml):	3.20E+00	6.27E-01	**Ca**	< 3.33E-01	
	Uncorrected weight of impurity in sample (µg):	460.80	114.11	574.91	<38.63	N
	Weight of impurity in blank (µg):	<65.27	<65.27		<17.32	
	Minimum corrected weight of impurity in sample (µg):	395.53	48.85	444.38	0.00	
	Maximum corrected weight of impurity in sample (µg):	460.80	114.11	574.91	38.63	
Al	Measured concentration of impurity in sample (µg/ml):	4.16E+00	8.05E-01	**Al**	1.37E-01	
	Uncorrected weight of impurity in sample (µg):	599.04	146.51	761.44	15.89	Y
	Weight of impurity in blank (µg):	7.70	3.94		5.07	
	Minimum corrected weight of impurity in sample (µg):	591.34	142.57	744.73	10.82	
	Maximum corrected weight of impurity in sample (µg):	591.34	142.57	744.73	10.82	
Ti	Measured concentration of impurity in sample (µg/ml):	1.01E-01	7.08E-02	**Ti**	6.21E-02	
	Uncorrected weight of impurity in sample (µg):	14.54	12.89	34.63	7.20	Y
	Weight of impurity in blank (µg):	< 1.04	< 1.04		< 0.28	
	Minimum corrected weight of impurity in sample (µg):	13.51	11.85	32.28	6.93	
	Maximum corrected weight of impurity in sample (µg):	14.54	12.89	34.63	7.20	
V	Measured concentration of impurity in sample (µg/ml):	9.90E-02	2.48E-02	**V**	7.12E-03	
	Uncorrected weight of impurity in sample (µg):	14.26	4.51	19.60	0.83	Y
	Weight of impurity in blank (µg):	< 0.03	< 0.03		< 0.01	
	Minimum corrected weight of impurity in sample (µg):	14.23	4.49	19.54	0.82	
	Maximum corrected weight of impurity in sample (µg):	14.26	4.51	19.60	0.83	

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17908 on 2/5/2018.

Fred C. Montgomery — Operator

2-8-18 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1223, 1309, 1319, 1800, 1805
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17121403	L17121903		W17121903	
	Total volume of leach solution (ml):	156.0	208.0		160.0	
	Radiochemical laboratory analysis number:	17908-003	1798-008		17908-013	
	Measured uranium concentration (µg/ml):	4.72E-01	5.43E-02		7.34E-03	
	Uncertainty in uranium concentration (µg/ml):	4.72E-02	5.43E-03		7.34E-04	
	Weight uranium leached (g):	7.36E-05	1.13E-05	8.49E-05	1.17E-06	N
	Uncertainty in weight uranium leached (g):	7.37E-06	1.13E-06	7.46E-06	1.18E-07	
	Equivalent number of leached kernels:	1.87E-01	2.87E-02	2.16E-01	2.98E-03	
	Uncertainty in equivalent number of leached kernels:	1.88E-02	2.88E-03	1.90E-02	3.00E-04	
Fe	Measured concentration of impurity in sample (µg/ml):	9.34E-01	1.50E-01	**Fe**	2.96E-02	
	Uncorrected weight of impurity in sample (µg):	145.70	31.20	181.64	4.74	Y
	Weight of impurity in blank (µg):	3.41	< 1.67		0.89	
	Minimum corrected weight of impurity in sample (µg):	142.29	29.53	175.66	3.84	
	Maximum corrected weight of impurity in sample (µg):	142.29	31.20	177.34	3.84	
Cr	Measured concentration of impurity in sample (µg/ml):	8.65E-03	< 2.91E-03	**Cr**	< 2.91E-03	
	Uncorrected weight of impurity in sample (µg):	1.35	< 0.61	< 1.95	< 0.47	N
	Weight of impurity in blank (µg):	< 0.57	< 0.57		< 0.15	
	Minimum corrected weight of impurity in sample (µg):	0.78	0.00	0.78	0.00	
	Maximum corrected weight of impurity in sample (µg):	1.35	0.61	1.95	0.47	
Mn	Measured concentration of impurity in sample (µg/ml):	1.41E-02	2.19E-03	**Mn**	< 4.92E-04	
	Uncorrected weight of impurity in sample (µg):	2.20	0.46	2.66	< 0.08	N
	Weight of impurity in blank (µg):	< 0.10	< 0.10		0.05	
	Minimum corrected weight of impurity in sample (µg):	2.10	0.36	2.46	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.20	0.46	2.66	0.03	
Co	Measured concentration of impurity in sample (µg/ml):	4.44E-04	6.32E-05	**Co**	< 3.52E-05	
	Uncorrected weight of impurity in sample (µg):	0.07	0.01	0.08	< 0.01	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.05	0.01	0.06	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.05	0.01	0.06	0.01	
Ni	Measured concentration of impurity in sample (µg/ml):	< 7.40E-03	< 7.40E-03	**Ni**	< 7.40E-03	
	Uncorrected weight of impurity in sample (µg):	< 1.15	< 1.54	< 2.69	< 1.18	N
	Weight of impurity in blank (µg):	< 1.45	< 1.45		< 0.38	
	Minimum corrected weight of impurity in sample (µg):	0.00	0.00	0.00	0.00	
	Maximum corrected weight of impurity in sample (µg):	1.15	1.54	2.69	1.18	
Ca	Measured concentration of impurity in sample (µg/ml):	3.25E+00	5.82E-01	**Ca**	< 3.33E-01	
	Uncorrected weight of impurity in sample (µg):	507.00	121.06	628.06	<53.28	N
	Weight of impurity in blank (µg):	<65.27	<65.27		<17.32	
	Minimum corrected weight of impurity in sample (µg):	441.73	55.79	497.52	0.00	
	Maximum corrected weight of impurity in sample (µg):	507.00	121.06	628.06	53.28	
Al	Measured concentration of impurity in sample (µg/ml):	4.08E+00	6.97E-01	**Al**	1.20E-01	
	Uncorrected weight of impurity in sample (µg):	636.48	144.98	800.66	19.20	Y
	Weight of impurity in blank (µg):	7.70	3.94		5.07	
	Minimum corrected weight of impurity in sample (µg):	628.78	141.04	783.94	14.13	
	Maximum corrected weight of impurity in sample (µg):	628.78	141.04	783.94	14.13	
Ti	Measured concentration of impurity in sample (µg/ml):	1.61E-01	1.03E-01	**Ti**	6.94E-02	
	Uncorrected weight of impurity in sample (µg):	25.12	21.42	57.64	11.10	Y
	Weight of impurity in blank (µg):	< 1.04	< 1.04		< 0.28	
	Minimum corrected weight of impurity in sample (µg):	24.08	20.39	55.30	10.83	
	Maximum corrected weight of impurity in sample (µg):	25.12	21.42	57.64	11.10	
V	Measured concentration of impurity in sample (µg/ml):	1.03E-01	2.06E-02	**V**	4.65E-03	
	Uncorrected weight of impurity in sample (µg):	16.07	4.28	21.10	0.74	Y
	Weight of impurity in blank (µg):	< 0.03	< 0.03		< 0.01	
	Minimum corrected weight of impurity in sample (µg):	16.04	4.26	21.04	0.74	
	Maximum corrected weight of impurity in sample (µg):	16.07	4.28	21.10	0.74	

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17908 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1221, 1240, 1243, 1266, 1316
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17121404	L17121904		W17121904	
Total volume of leach solution (ml):		182.0	180.0		148.0	
Radiochemical laboratory analysis number:		17908-004	17908-009		17908-014	
Measured uranium concentration (µg/ml):		1.46E-01	1.78E-02		3.12E-03	
Uncertainty in uranium concentration (µg/ml):		1.46E-02	1.78E-03		3.12E-04	
Weight uranium leached (g):		2.66E-05	3.20E-06	2.98E-05	4.62E-07	N
Uncertainty in weight uranium leached (g):		2.66E-06	3.21E-07	2.68E-06	4.62E-08	
Equivalent number of leached kernels:		6.74E-02	8.13E-03	7.56E-02	1.17E-03	
Uncertainty in equivalent number of leached kernels:		6.78E-03	8.18E-04	6.84E-03	1.18E-04	
Fe	Measured concentration of impurity in sample (µg/ml):	7.56E-01	1.32E-01	**Fe**	2.43E-02	
	Uncorrected weight of impurity in sample (µg):	137.59	23.76	164.95	3.60	Y
	Weight of impurity in blank (µg):	3.41	< 1.67		0.89	
	Minimum corrected weight of impurity in sample (µg):	134.18	22.09	158.97	2.70	
	Maximum corrected weight of impurity in sample (µg):	134.18	23.76	160.64	2.70	
Cr	Measured concentration of impurity in sample (µg/ml):	4.83E-03	3.44E-03	**Cr**	< 2.91E-03	
	Uncorrected weight of impurity in sample (µg):	0.88	0.62	1.50	< 0.43	N
	Weight of impurity in blank (µg):	< 0.57	< 0.57		< 0.15	
	Minimum corrected weight of impurity in sample (µg):	0.31	0.05	0.36	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.88	0.62	1.50	0.43	
Mn	Measured concentration of impurity in sample (µg/ml):	1.19E-02	1.72E-03	**Mn**	< 4.92E-04	
	Uncorrected weight of impurity in sample (µg):	2.17	0.31	2.48	< 0.07	N
	Weight of impurity in blank (µg):	< 0.10	< 0.10		0.05	
	Minimum corrected weight of impurity in sample (µg):	2.07	0.21	2.28	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.17	0.31	2.48	0.02	
Co	Measured concentration of impurity in sample (µg/ml):	4.26E-04	7.72E-05	**Co**	4.40E-05	
	Uncorrected weight of impurity in sample (µg):	0.08	0.01	0.10	0.01	Y
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.06	0.01	0.07	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.06	0.01	0.08	0.01	
Ni	Measured concentration of impurity in sample (µg/ml):	1.16E-02	< 7.40E-03	**Ni**	< 7.40E-03	
	Uncorrected weight of impurity in sample (µg):	2.11	< 1.33	< 3.44	< 1.10	N
	Weight of impurity in blank (µg):	< 1.45	< 1.45		< 0.38	
	Minimum corrected weight of impurity in sample (µg):	0.66	0.00	0.66	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.11	1.33	3.44	1.10	
Ca	Measured concentration of impurity in sample (µg/ml):	3.04E+00	4.89E-01	**Ca**	< 3.33E-01	
	Uncorrected weight of impurity in sample (µg):	553.28	88.02	641.30	<49.28	N
	Weight of impurity in blank (µg):	<65.27	<65.27		<17.32	
	Minimum corrected weight of impurity in sample (µg):	488.01	22.75	510.76	0.00	
	Maximum corrected weight of impurity in sample (µg):	553.28	88.02	641.30	49.28	
Al	Measured concentration of impurity in sample (µg/ml):	3.62E+00	6.35E-01	**Al**	1.16E-01	
	Uncorrected weight of impurity in sample (µg):	658.84	114.30	790.31	17.17	Y
	Weight of impurity in blank (µg):	7.70	3.94		5.07	
	Minimum corrected weight of impurity in sample (µg):	651.14	110.36	773.60	12.10	
	Maximum corrected weight of impurity in sample (µg):	651.14	110.36	773.60	12.10	
Ti	Measured concentration of impurity in sample (µg/ml):	6.20E-02	3.52E-02	**Ti**	4.73E-02	
	Uncorrected weight of impurity in sample (µg):	11.28	6.34	24.62	7.00	Y
	Weight of impurity in blank (µg):	< 1.04	< 1.04		< 0.28	
	Minimum corrected weight of impurity in sample (µg):	10.25	5.30	22.27	6.73	
	Maximum corrected weight of impurity in sample (µg):	11.28	6.34	24.62	7.00	
V	Measured concentration of impurity in sample (µg/ml):	7.97E-02	2.10E-02	**V**	8.90E-03	
	Uncorrected weight of impurity in sample (µg):	14.51	3.78	19.60	1.32	Y
	Weight of impurity in blank (µg):	< 0.03	< 0.03		< 0.01	
	Minimum corrected weight of impurity in sample (µg):	14.48	3.75	19.54	1.31	
	Maximum corrected weight of impurity in sample (µg):	14.51	3.78	19.60	1.32	

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17908 on 2/5/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	Pre-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total
	Pre-burn leach solution ID:	L17121405	L17121905	
	Total volume of leach solution (ml):	196.0	196.0	
	Radiochemical laboratory analysis number:	17908-005	17908-010	
	Measured uranium concentration (µg/ml):	1.76E-04	5.84E-05	
	Uncertainty in uranium concentration (µg/ml):	1.76E-05	5.84E-06	
	Weight uranium leached (g):	3.45E-08	1.14E-08	4.59E-08
	Uncertainty in weight uranium leached (g):	3.45E-09	1.15E-09	3.64E-09
	Equivalent number of leached kernels:	8.76E-05	2.91E-05	1.17E-04
	Uncertainty in equivalent number of leached kernels:	8.80E-06	2.92E-06	9.30E-06
Fe	Measured concentration (µg/ml):	1.74E-02	< 8.54E-03	**Fe**
	Total weight of leached impurity (µg):	3.41	< 1.67	< 5.98
Cr	Measured concentration (µg/ml):	< 2.91E-03	< 2.91E-03	**Cr**
	Total weight of leached impurity (µg):	< 0.57	< 0.57	< 1.14
Mn	Measured concentration (µg/ml):	< 4.92E-04	< 4.92E-04	**Mn**
	Total weight of leached impurity (µg):	< 0.10	< 0.10	< 0.24
Co	Measured concentration (µg/ml):	1.00E-04	< 3.52E-05	**Co**
	Total weight of leached impurity (µg):	0.02	< 0.01	< 0.03
Ni	Measured concentration (µg/ml):	< 7.40E-03	< 7.40E-03	**Ni**
	Total weight of leached impurity (µg):	< 1.45	< 1.45	< 2.90
Ca	Measured concentration (µg/ml):	< 3.33E-01	< 3.33E-01	**Ca**
	Total weight of leached impurity (µg):	<65.27	<65.27	<130.54
Al	Measured concentration (µg/ml):	3.93E-02	2.01E-02	**Al**
	Total weight of leached impurity (µg):	7.70	3.94	16.71
Ti	Measured concentration (µg/ml):	< 5.29E-03	< 5.29E-03	**Ti**
	Total weight of leached impurity (µg):	< 1.04	< 1.04	< 2.07
V	Measured concentration (µg/ml):	< 1.33E-04	< 1.33E-04	**V**
	Total weight of leached impurity (µg):	< 0.03	< 0.03	< 0.05

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17908 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1225, 1287, 1303, 1802, 1829
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B18010401	B18010801		W18010801	
	Total volume of leach solution (ml):	48.0	54.2		21.0	
	Radiochemical laboratory analysis number:	18063-001	18063-006		18063-011	
	Measured uranium concentration (µg/ml):	1.03E-01	2.61E-03		3.83E-04	
	Uncertainty in uranium concentration (µg/ml):	1.03E-02	2.61E-04		3.83E-05	
	Weight uranium leached (g):	4.94E-06	1.41E-07	5.09E-06	8.04E-09	N
	Uncertainty in weight uranium leached (g):	4.99E-07	1.42E-08	4.99E-07	8.42E-10	
	Equivalent number of leached kernels:	1.25E-02	3.59E-04	1.29E-02	2.04E-05	
	Uncertainty in equivalent number of leached kernels:	1.27E-03	3.63E-05	1.27E-03	2.15E-06	
Fe	Measured concentration of impurity in sample (µg/ml):	4.73E+00	9.58E-02	Fe	1.43E-02	
Fe	Uncorrected weight of impurity in sample (µg):	227.04	5.19	232.23	0.30	N
Fe	Weight of impurity in blank (µg):	1.06	0.73		0.15	
Fe	Minimum corrected weight of impurity in sample (µg):	225.98	4.46	230.44	0.15	
Fe	Maximum corrected weight of impurity in sample (µg):	225.98	4.46	230.44	0.15	
Cr	Measured concentration of impurity in sample (µg/ml):	1.09E-02	< 2.91E-03	Cr	< 2.91E-03	
Cr	Uncorrected weight of impurity in sample (µg):	0.52	< 0.16	< 0.68	< 0.06	N
Cr	Weight of impurity in blank (µg):	0.16	0.20		0.04	
Cr	Minimum corrected weight of impurity in sample (µg):	0.36	0.00	0.36	0.00	
Cr	Maximum corrected weight of impurity in sample (µg):	0.36	0.00	0.36	0.02	
Mn	Measured concentration of impurity in sample (µg/ml):	3.69E-03	< 4.92E-04	Mn	< 4.92E-04	
Mn	Uncorrected weight of impurity in sample (µg):	0.18	< 0.03	< 0.20	< 0.01	N
Mn	Weight of impurity in blank (µg):	0.04	0.04		0.01	
Mn	Minimum corrected weight of impurity in sample (µg):	0.14	0.00	0.14	0.00	
Mn	Maximum corrected weight of impurity in sample (µg):	0.14	0.00	0.14	0.00	
Co	Measured concentration of impurity in sample (µg/ml):	3.74E-03	1.33E-04	Co	< 3.52E-05	
Co	Uncorrected weight of impurity in sample (µg):	0.18	0.01	0.19	< 0.00	N
Co	Weight of impurity in blank (µg):	0.00	0.00		< 0.00	
Co	Minimum corrected weight of impurity in sample (µg):	0.18	0.00	0.18	0.00	
Co	Maximum corrected weight of impurity in sample (µg):	0.18	0.00	0.18	0.00	
Ni	Measured concentration of impurity in sample (µg/ml):	4.08E-02	< 7.40E-03	Ni	< 7.40E-03	
Ni	Uncorrected weight of impurity in sample (µg):	1.96	< 0.40	< 2.36	< 0.16	N
Ni	Weight of impurity in blank (µg):	< 0.35	< 0.34		< 0.11	
Ni	Minimum corrected weight of impurity in sample (µg):	1.61	0.00	1.61	0.00	
Ni	Maximum corrected weight of impurity in sample (µg):	1.96	0.40	2.36	0.16	
Ca	Measured concentration of impurity in sample (µg/ml):	9.58E-01	< 3.33E-01	Ca	< 3.33E-01	
Ca	Uncorrected weight of impurity in sample (µg):	45.98	<18.05	<64.03	< 6.99	N
Ca	Weight of impurity in blank (µg):	<15.65	16.77		< 5.00	
Ca	Minimum corrected weight of impurity in sample (µg):	30.33	0.00	30.33	0.00	
Ca	Maximum corrected weight of impurity in sample (µg):	45.98	1.28	47.26	6.99	
Al	Measured concentration of impurity in sample (µg/ml):	7.34E-01	1.83E-01	Al	2.81E-02	
Al	Uncorrected weight of impurity in sample (µg):	35.23	9.92	45.15	0.59	N
Al	Weight of impurity in blank (µg):	5.88	11.46		1.09	
Al	Minimum corrected weight of impurity in sample (µg):	29.36	0.00	29.36	0.00	
Al	Maximum corrected weight of impurity in sample (µg):	29.36	0.00	29.36	0.00	
Ti	Measured concentration of impurity in sample (µg/ml):	2.88E-01	4.82E-02	Ti	< 5.29E-03	
Ti	Uncorrected weight of impurity in sample (µg):	13.82	2.61	16.44	< 0.11	N
Ti	Weight of impurity in blank (µg):	< 0.25	< 0.24		< 0.08	
Ti	Minimum corrected weight of impurity in sample (µg):	13.58	2.37	15.94	0.00	
Ti	Maximum corrected weight of impurity in sample (µg):	13.82	2.61	16.44	0.11	
V	Measured concentration of impurity in sample (µg/ml):	1.39E-01	1.61E-03	V	< 1.33E-04	
V	Uncorrected weight of impurity in sample (µg):	6.67	0.09	6.76	< 0.00	N
V	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
V	Minimum corrected weight of impurity in sample (µg):	6.65	0.08	6.73	0.00	
V	Maximum corrected weight of impurity in sample (µg):	6.65	0.09	6.74	0.00	

Comments

FCM checked the data against the Official Results of Analyses report for RMAL18063 on 2/7/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1227, 1241, 1264, 1819, 1831
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B18010402	B18010802		W18010802	
	Total volume of leach solution (ml):	44.0	50.2		20.0	
	Radiochemical laboratory analysis number:	18063-002	18063-007		18063-012	
	Measured uranium concentration (µg/ml):	1.21E-01	2.32E-03		4.17E-04	
	Uncertainty in uranium concentration (µg/ml):	1.21E-02	2.32E-04		4.17E-05	
	Weight uranium leached (g):	5.32E-06	1.16E-07	5.44E-06	8.34E-09	N
	Uncertainty in weight uranium leached (g):	5.38E-07	1.17E-08	5.38E-07	8.77E-10	
	Equivalent number of leached kernels:	1.35E-02	2.96E-04	1.38E-02	2.12E-05	
	Uncertainty in equivalent number of leached kernels:	1.37E-03	3.00E-05	1.37E-03	2.24E-06	
	Measured concentration of impurity in sample (µg/ml):	5.72E+00	8.34E-02	**Fe**	1.91E-02	
Fe	Uncorrected weight of impurity in sample (µg):	251.68	4.19	255.87	0.38	N
	Weight of impurity in blank (µg):	1.06	0.73		0.15	
	Minimum corrected weight of impurity in sample (µg):	250.62	3.46	254.08	0.23	
	Maximum corrected weight of impurity in sample (µg):	250.62	3.46	254.08	0.23	
	Measured concentration of impurity in sample (µg/ml):	7.15E-03	< 2.91E-03	**Cr**	< 2.91E-03	
Cr	Uncorrected weight of impurity in sample (µg):	0.31	< 0.15	< 0.46	< 0.06	N
	Weight of impurity in blank (µg):	0.16	0.20		0.04	
	Minimum corrected weight of impurity in sample (µg):	0.15	0.00	0.15	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.15	0.00	0.15	0.01	
	Measured concentration of impurity in sample (µg/ml):	4.87E-03	< 4.92E-04	**Mn**	< 4.92E-04	
Mn	Uncorrected weight of impurity in sample (µg):	0.21	< 0.02	< 0.24	< 0.01	N
	Weight of impurity in blank (µg):	0.04	0.04		0.01	
	Minimum corrected weight of impurity in sample (µg):	0.17	0.00	0.17	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.17	0.00	0.17	0.00	
	Measured concentration of impurity in sample (µg/ml):	3.97E-03	8.28E-05	**Co**	< 3.52E-05	
Co	Uncorrected weight of impurity in sample (µg):	0.17	0.00	0.18	< 0.00	N
	Weight of impurity in blank (µg):	0.00	0.00		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.17	0.00	0.17	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.17	0.00	0.17	0.00	
	Measured concentration of impurity in sample (µg/ml):	4.98E-02	< 7.40E-03	**Ni**	< 7.40E-03	
Ni	Uncorrected weight of impurity in sample (µg):	2.19	< 0.37	< 2.56	< 0.15	N
	Weight of impurity in blank (µg):	< 0.35	< 0.34		< 0.11	
	Minimum corrected weight of impurity in sample (µg):	1.84	0.00	1.84	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.19	0.37	2.56	0.15	
	Measured concentration of impurity in sample (µg/ml):	1.54E+00	< 3.33E-01	**Ca**	< 3.33E-01	
Ca	Uncorrected weight of impurity in sample (µg):	67.76	<16.72	<84.48	< 6.66	N
	Weight of impurity in blank (µg):	<15.65	16.77		< 5.00	
	Minimum corrected weight of impurity in sample (µg):	52.11	0.00	52.11	0.00	
	Maximum corrected weight of impurity in sample (µg):	67.76	0.00	67.76	6.66	
	Measured concentration of impurity in sample (µg/ml):	2.08E+00	1.80E-01	**Al**	3.18E-02	
Al	Uncorrected weight of impurity in sample (µg):	91.52	9.04	100.56	0.64	N
	Weight of impurity in blank (µg):	5.88	11.46		1.09	
	Minimum corrected weight of impurity in sample (µg):	85.65	0.00	85.65	0.00	
	Maximum corrected weight of impurity in sample (µg):	85.65	0.00	85.65	0.00	
	Measured concentration of impurity in sample (µg/ml):	5.87E-01	2.83E-02	**Ti**	< 5.29E-03	
Ti	Uncorrected weight of impurity in sample (µg):	25.83	1.42	27.25	< 0.11	N
	Weight of impurity in blank (µg):	< 0.25	< 0.24		< 0.08	
	Minimum corrected weight of impurity in sample (µg):	25.58	1.18	26.76	0.00	
	Maximum corrected weight of impurity in sample (µg):	25.83	1.42	27.25	0.11	
	Measured concentration of impurity in sample (µg/ml):	1.74E-01	1.65E-03	**V**	3.18E-04	
V	Uncorrected weight of impurity in sample (µg):	7.66	0.08	7.74	0.01	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	7.64	0.08	7.71	0.00	
	Maximum corrected weight of impurity in sample (µg):	7.64	0.08	7.72	0.01	

Comments

FCM checked the data against the Official Results of Analyses report for RMAL18063 on 2/7/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1223, 1309, 1319, 1800, 1805
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B18010403	B18010803		W18010803	
Total volume of leach solution (ml):		45.0	49.8		19.0	
Radiochemical laboratory analysis number:		18063-003	18063-008		18063-013	
Measured uranium concentration (µg/ml):		1.13E+00	1.83E-03		3.71E-04	
Uncertainty in uranium concentration (µg/ml):		1.13E-01	1.83E-04		3.71E-05	
Weight uranium leached (g):		5.09E-05	9.11E-08	5.09E-05	7.05E-09	N
Uncertainty in weight uranium leached (g):		5.14E-06	9.19E-09	5.14E-06	7.45E-10	
Equivalent number of leached kernels:		1.29E-01	2.31E-04	1.29E-01	1.79E-05	
Uncertainty in equivalent number of leached kernels:		1.31E-02	2.34E-05	1.31E-02	1.90E-06	
	Measured concentration of impurity in sample (µg/ml):	4.25E+00	7.14E-02	Fe	2.71E-02	
	Uncorrected weight of impurity in sample (µg):	191.25	3.56	195.32	0.51	Y
Fe	Weight of impurity in blank (µg):	1.06	0.73		0.15	
	Minimum corrected weight of impurity in sample (µg):	190.19	2.83	193.39	0.37	
	Maximum corrected weight of impurity in sample (µg):	190.19	2.83	193.39	0.37	
	Measured concentration of impurity in sample (µg/ml):	7.43E-03	< 2.91E-03	Cr	< 2.91E-03	
	Uncorrected weight of impurity in sample (µg):	0.33	< 0.14	< 0.48	< 0.06	N
Cr	Weight of impurity in blank (µg):	0.16	0.20		0.04	
	Minimum corrected weight of impurity in sample (µg):	0.17	0.00	0.17	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.17	0.00	0.17	0.01	
	Measured concentration of impurity in sample (µg/ml):	4.44E-03	4.97E-04	Mn	< 4.92E-04	
	Uncorrected weight of impurity in sample (µg):	0.20	0.02	0.22	< 0.01	N
Mn	Weight of impurity in blank (µg):	0.04	0.04		0.01	
	Minimum corrected weight of impurity in sample (µg):	0.16	0.00	0.16	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.16	0.00	0.16	0.00	
	Measured concentration of impurity in sample (µg/ml):	2.68E-03	8.72E-05	Co	< 3.52E-05	
	Uncorrected weight of impurity in sample (µg):	0.12	0.00	0.12	< 0.00	N
Co	Weight of impurity in blank (µg):	0.00	0.00		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.12	0.00	0.12	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.12	0.00	0.12	0.00	
	Measured concentration of impurity in sample (µg/ml):	5.17E-02	3.90E-02	Ni	< 7.40E-03	
	Uncorrected weight of impurity in sample (µg):	2.33	1.94	4.27	< 0.14	N
Ni	Weight of impurity in blank (µg):	< 0.35	< 0.34		< 0.11	
	Minimum corrected weight of impurity in sample (µg):	1.98	1.60	3.58	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.33	1.94	4.27	0.14	
	Measured concentration of impurity in sample (µg/ml):	1.11E+00	< 3.33E-01	Ca	< 3.33E-01	
	Uncorrected weight of impurity in sample (µg):	49.95	<16.58	<66.53	< 6.33	N
Ca	Weight of impurity in blank (µg):	<15.65	16.77		< 5.00	
	Minimum corrected weight of impurity in sample (µg):	34.30	0.00	34.30	0.00	
	Maximum corrected weight of impurity in sample (µg):	49.95	0.00	49.95	6.33	
	Measured concentration of impurity in sample (µg/ml):	8.76E-01	1.46E-01	Al	2.67E-02	
	Uncorrected weight of impurity in sample (µg):	39.42	7.27	46.69	0.51	N
Al	Weight of impurity in blank (µg):	5.88	11.46		1.09	
	Minimum corrected weight of impurity in sample (µg):	33.55	0.00	33.55	0.00	
	Maximum corrected weight of impurity in sample (µg):	33.55	0.00	33.55	0.00	
	Measured concentration of impurity in sample (µg/ml):	4.58E-01	3.94E-02	Ti	< 5.29E-03	
	Uncorrected weight of impurity in sample (µg):	20.61	1.96	22.57	< 0.10	N
Ti	Weight of impurity in blank (µg):	< 0.25	< 0.24		< 0.08	
	Minimum corrected weight of impurity in sample (µg):	20.36	1.72	22.08	0.00	
	Maximum corrected weight of impurity in sample (µg):	20.61	1.96	22.57	0.10	
	Measured concentration of impurity in sample (µg/ml):	1.40E-01	8.34E-04	V	< 1.33E-04	
	Uncorrected weight of impurity in sample (µg):	6.30	0.04	6.34	< 0.00	N
V	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	6.28	0.04	6.32	0.00	
	Maximum corrected weight of impurity in sample (µg):	6.28	0.04	6.32	0.00	

Comments

FCM checked the data against the Official Results of Analyses report for RMAL18063 on 2/7/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1221, 1240, 1243, 1266, 1316
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B18010404	B18010804		W18010804	
Total volume of leach solution (ml):		44.0	39.5		21.0	
Radiochemical laboratory analysis number:		18063-004	18063-009		18063-014	
Measured uranium concentration (µg/ml):		1.12E-01	3.93E-03		1.44E-03	
Uncertainty in uranium concentration (µg/ml):		1.12E-02	3.93E-04		1.44E-04	
Weight uranium leached (g):		4.93E-06	1.55E-07	5.08E-06	3.02E-08	N
Uncertainty in weight uranium leached (g):		4.98E-07	1.57E-08	4.98E-07	3.17E-09	
Equivalent number of leached kernels:		1.25E-02	3.94E-04	1.29E-02	7.68E-05	
Uncertainty in equivalent number of leached kernels:		1.27E-03	4.01E-05	1.27E-03	8.07E-06	
Fe	Measured concentration of impurity in sample (µg/ml):	4.62E+00	8.16E-02	**Fe**	2.56E-02	
	Uncorrected weight of impurity in sample (µg):	203.28	3.22	207.04	0.54	Y
	Weight of impurity in blank (µg):	1.06	0.73		0.15	
	Minimum corrected weight of impurity in sample (µg):	202.22	2.49	205.11	0.39	
	Maximum corrected weight of impurity in sample (µg):	202.22	2.49	205.11	0.39	
Cr	Measured concentration of impurity in sample (µg/ml):	6.84E-03	3.55E-03	**Cr**	< 2.91E-03	
	Uncorrected weight of impurity in sample (µg):	0.30	0.14	0.44	< 0.06	N
	Weight of impurity in blank (µg):	0.16	0.20		0.04	
	Minimum corrected weight of impurity in sample (µg):	0.14	0.00	0.14	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.14	0.00	0.14	0.02	
Mn	Measured concentration of impurity in sample (µg/ml):	4.67E-03	6.89E-04	**Mn**	9.36E-04	
	Uncorrected weight of impurity in sample (µg):	0.21	0.03	0.25	0.02	Y
	Weight of impurity in blank (µg):	0.04	0.04		0.01	
	Minimum corrected weight of impurity in sample (µg):	0.16	0.00	0.17	0.01	
	Maximum corrected weight of impurity in sample (µg):	0.16	0.00	0.17	0.01	
Co	Measured concentration of impurity in sample (µg/ml):	3.05E-03	1.11E-04	**Co**	< 3.52E-05	
	Uncorrected weight of impurity in sample (µg):	0.13	0.00	0.14	< 0.00	N
	Weight of impurity in blank (µg):	0.00	0.00		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.13	0.00	0.13	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.13	0.00	0.13	0.00	
Ni	Measured concentration of impurity in sample (µg/ml):	6.41E-02	1.29E-02	**Ni**	4.19E-02	
	Uncorrected weight of impurity in sample (µg):	2.82	0.51	4.21	0.88	Y
	Weight of impurity in blank (µg):	< 0.35	< 0.34		< 0.11	
	Minimum corrected weight of impurity in sample (µg):	2.47	0.17	3.41	0.77	
	Maximum corrected weight of impurity in sample (µg):	2.82	0.51	4.21	0.88	
Ca	Measured concentration of impurity in sample (µg/ml):	1.64E+00	< 3.33E-01	**Ca**	< 3.33E-01	
	Uncorrected weight of impurity in sample (µg):	72.16	<13.15	<85.31	< 6.99	N
	Weight of impurity in blank (µg):	<15.65	16.77		< 5.00	
	Minimum corrected weight of impurity in sample (µg):	56.51	0.00	56.51	0.00	
	Maximum corrected weight of impurity in sample (µg):	72.16	0.00	72.16	6.99	
Al	Measured concentration of impurity in sample (µg/ml):	2.11E+00	2.42E-01	**Al**	2.24E-01	
	Uncorrected weight of impurity in sample (µg):	92.84	9.56	107.10	4.70	Y
	Weight of impurity in blank (µg):	5.88	11.46		1.09	
	Minimum corrected weight of impurity in sample (µg):	86.97	0.00	90.58	3.61	
	Maximum corrected weight of impurity in sample (µg):	86.97	0.00	90.58	3.61	
Ti	Measured concentration of impurity in sample (µg/ml):	5.39E-01	3.67E-02	**Ti**	< 5.29E-03	
	Uncorrected weight of impurity in sample (µg):	23.72	1.45	25.17	< 0.11	N
	Weight of impurity in blank (µg):	< 0.25	< 0.24		< 0.08	
	Minimum corrected weight of impurity in sample (µg):	23.47	1.21	24.67	0.00	
	Maximum corrected weight of impurity in sample (µg):	23.72	1.45	25.17	0.11	
V	Measured concentration of impurity in sample (µg/ml):	1.61E-01	2.43E-03	**V**	1.83E-04	
	Uncorrected weight of impurity in sample (µg):	7.08	0.10	7.18	0.00	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	7.06	0.09	7.15	0.00	
	Maximum corrected weight of impurity in sample (µg):	7.06	0.10	7.16	0.00	

Comments

FCM checked the data against the Official Results of Analyses report for RMAL18063 on 2/7/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	Post-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 1_DRF26R3.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total
	Post-burn leach solution ID:	B18010405	B18010805	
	Total volume of leach solution (ml):	47.0	46.2	
	Radiochemical laboratory analysis number:	18063-005	18063-010	
	Measured uranium concentration (µg/ml):	2.34E-04	4.60E-05	
	Uncertainty in uranium concentration (µg/ml):	2.34E-05	4.60E-06	
	Weight uranium leached (g):	1.10E-08	2.13E-09	1.31E-08
	Uncertainty in weight uranium leached (g):	1.11E-09	2.15E-10	1.13E-09
	Equivalent number of leached kernels:	2.79E-05	5.39E-06	3.33E-05
	Uncertainty in equivalent number of leached kernels:	2.83E-06	5.47E-07	2.89E-06
Fe	Measured concentration (µg/ml):	2.25E-02	1.58E-02	**Fe**
	Total weight of leached impurity (µg):	1.06	0.73	1.94
Cr	Measured concentration (µg/ml):	3.43E-03	4.37E-03	**Cr**
	Total weight of leached impurity (µg):	0.16	0.20	0.41
Mn	Measured concentration (µg/ml):	8.64E-04	8.60E-04	**Mn**
	Total weight of leached impurity (µg):	0.04	0.04	0.09
Co	Measured concentration (µg/ml):	7.76E-05	6.56E-05	**Co**
	Total weight of leached impurity (µg):	0.00	0.00	0.01
Ni	Measured concentration (µg/ml):	< 7.40E-03	< 7.40E-03	**Ni**
	Total weight of leached impurity (µg):	< 0.35	< 0.34	< 0.69
Ca	Measured concentration (µg/ml):	< 3.33E-01	3.63E-01	**Ca**
	Total weight of leached impurity (µg):	<15.65	16.77	<32.42
Al	Measured concentration (µg/ml):	1.25E-01	2.48E-01	**Al**
	Total weight of leached impurity (µg):	5.88	11.46	17.33
Ti	Measured concentration (µg/ml):	< 5.29E-03	< 5.29E-03	**Ti**
	Total weight of leached impurity (µg):	< 0.25	< 0.24	< 0.49
V	Measured concentration (µg/ml):	4.18E-04	< 1.33E-04	**V**
	Total weight of leached impurity (µg):	0.02	< 0.01	< 0.03

Comments

FCM checked the data against the Official Results of Analyses report for RMAL18063 on 2/7/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1233, 1254, 1287, 1291, 1821
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L18011701	L18011901		W18011901	
	Total volume of leach solution (ml):	115.0	96.0		88.2	
	Radiochemical laboratory analysis number:	18062-001	18062-006		18062-011	
	Measured uranium concentration (µg/ml):	1.41E-01	1.95E-02		3.42E-03	
	Uncertainty in uranium concentration (µg/ml):	1.41E-02	1.95E-03		3.42E-04	
	Weight uranium leached (g):	1.62E-05	1.87E-06	1.81E-05	3.02E-07	N
	Uncertainty in weight uranium leached (g):	1.62E-06	1.88E-07	1.63E-06	3.02E-08	
	Equivalent number of leached kernels:	4.12E-02	4.75E-03	4.59E-02	7.66E-04	
	Uncertainty in equivalent number of leached kernels:	4.14E-03	4.79E-04	4.17E-03	7.71E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the official Results of Analyses report for RMAL18062 on 2/07/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1236, 1305, 1321, 1807, 1808
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L18011702	L18011902		W18011902	
	Total volume of leach solution (ml):	122.0	96.0		71.5	
	Radiochemical laboratory analysis number:	18062-002	18062-007		18062-012	
	Measured uranium concentration (µg/ml):	2.81E+00	2.58E-01		8.59E-02	
	Uncertainty in uranium concentration (µg/ml):	2.81E-01	2.58E-02		8.59E-03	
	Weight uranium leached (g):	3.43E-04	2.48E-05	3.74E-04	6.14E-06	Y
	Uncertainty in weight uranium leached (g):	3.43E-05	2.48E-06	3.44E-05	6.17E-07	
	Equivalent number of leached kernels:	8.70E-01	6.29E-02	9.49E-01	1.56E-02	
	Uncertainty in equivalent number of leached kernels:	8.76E-02	6.33E-03	8.79E-02	1.57E-03	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the official Results of Analyses report for RMAL18062 on 2/07/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1257, 1258, 1285, 1298, 1324
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L18011703	L18011903		W18011903	
	Total volume of leach solution (ml):	118.0	94.0		70.0	
	Radiochemical laboratory analysis number:	18062-003	18062-008		18062-013	
	Measured uranium concentration (µg/ml):	9.39E-02	1.24E-02		2.55E-03	
	Uncertainty in uranium concentration (µg/ml):	9.39E-03	1.24E-03		2.55E-04	
	Weight uranium leached (g):	1.11E-05	1.17E-06	1.22E-05	1.79E-07	N
	Uncertainty in weight uranium leached (g):	1.11E-06	1.17E-07	1.12E-06	1.79E-08	
	Equivalent number of leached kernels:	2.81E-02	2.96E-03	3.11E-02	4.53E-04	
	Uncertainty in equivalent number of leached kernels:	2.83E-03	2.98E-04	2.85E-03	4.57E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the official Results of Analyses report for RMAL18062 on 2/07/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1277, 1279, 1314, 1812, 1828
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L18011704	L18011904		W18011904	
Total volume of leach solution (ml):		109.0	104.0		73.2	
Radiochemical laboratory analysis number:		18062-004	18062-009		18062-014	
Measured uranium concentration (µg/ml):		1.14E-01	2.19E-02		4.60E-03	
Uncertainty in uranium concentration (µg/ml):		1.14E-02	2.19E-03		4.60E-04	
Weight uranium leached (g):		1.24E-05	2.28E-06	1.47E-05	3.37E-07	N
Uncertainty in weight uranium leached (g):		1.24E-06	2.28E-07	1.27E-06	3.38E-08	
Equivalent number of leached kernels:		3.15E-02	5.78E-03	3.73E-02	8.55E-04	
Uncertainty in equivalent number of leached kernels:		3.18E-03	5.82E-04	3.23E-03	8.62E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the official Results of Analyses report for RMAL18062 on 2/07/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	Pre-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total
	Pre-burn leach solution ID:	L18011705	L18011905	
	Total volume of leach solution (ml):	150.0	100.0	
	Radiochemical laboratory analysis number:	18062-005	18062-010	
	Measured uranium concentration (µg/ml):	1.61E-04	1.00E-04	
	Uncertainty in uranium concentration (µg/ml):	1.61E-05	1.00E-05	
	Weight uranium leached (g):	2.42E-08	1.00E-08	3.42E-08
	Uncertainty in weight uranium leached (g):	2.42E-09	1.00E-09	2.62E-09
	Equivalent number of leached kernels:	6.13E-05	2.54E-05	8.67E-05
	Uncertainty in equivalent number of leached kernels:	6.17E-06	2.56E-06	6.70E-06
Fe	Measured concentration (µg/ml):			**Fe**
	Total weight of leached impurity (µg):			
Cr	Measured concentration (µg/ml):			**Cr**
	Total weight of leached impurity (µg):			
Mn	Measured concentration (µg/ml):			**Mn**
	Total weight of leached impurity (µg):			
Co	Measured concentration (µg/ml):			**Co**
	Total weight of leached impurity (µg):			
Ni	Measured concentration (µg/ml):			**Ni**
	Total weight of leached impurity (µg):			
Ca	Measured concentration (µg/ml):			**Ca**
	Total weight of leached impurity (µg):			
Al	Measured concentration (µg/ml):			**Al**
	Total weight of leached impurity (µg):			
Ti	Measured concentration (µg/ml):			**Ti**
	Total weight of leached impurity (µg):			
V	Measured concentration (µg/ml):			**V**
	Total weight of leached impurity (µg):			

Comments

FCM checked the data against the official Results of Analyses report for RMAL18062 on 2/07/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1233, 1254, 1287, 1291, 1821
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B18012901	B18013001		W18013001	
Total volume of leach solution (ml):		45.2	48.0		50.0	
Radiochemical laboratory analysis number:		18079-001	18079-006		18079-011	
Measured uranium concentration (µg/ml):		1.02E+01	4.53E-02		4.27E-03	
Uncertainty in uranium concentration (µg/ml):		1.02E+00	4.53E-03		4.27E-04	
Weight uranium leached (g):		4.61E-04	2.17E-06	4.63E-04	2.14E-07	N
Uncertainty in weight uranium leached (g):		4.66E-05	2.19E-07	4.66E-05	2.15E-08	
Equivalent number of leached kernels:		1.17E+00	5.52E-03	1.18E+00	5.42E-04	
Uncertainty in equivalent number of leached kernels:		1.19E-01	5.60E-04	1.19E-01	5.49E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the official Results of Analyses report for RMAL18079 on 2/07/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1236, 1305, 1321, 1807, 1808
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B18012902	B18013002		W18013002	
	Total volume of leach solution (ml):	45.0	47.8		49.5	
	Radiochemical laboratory analysis number:	18079-002	18079-007		18079-012	
	Measured uranium concentration (µg/ml):	1.89E+01	4.82E-02		3.25E-03	
	Uncertainty in uranium concentration (µg/ml):	1.89E+00	4.82E-03		3.25E-04	
	Weight uranium leached (g):	8.51E-04	2.30E-06	8.53E-04	1.61E-07	N
	Uncertainty in weight uranium leached (g):	8.59E-05	2.33E-07	8.59E-05	1.62E-08	
	Equivalent number of leached kernels:	2.16E+00	5.85E-03	2.16E+00	4.08E-04	
	Uncertainty in equivalent number of leached kernels:	2.19E-01	5.93E-04	2.19E-01	4.14E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the official Results of Analyses report for RMAL18079 on 2/07/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1257, 1258, 1285, 1298, 1324
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B18012903	B18013003		W18013003	
Total volume of leach solution (ml):		46.0	48.8		49.2	
Radiochemical laboratory analysis number:		18079-003	18079-008		18079-013	
Measured uranium concentration (µg/ml):		1.24E-01	5.42E-03		8.06E-04	
Uncertainty in uranium concentration (µg/ml):		1.24E-02	5.42E-04		8.06E-05	
Weight uranium leached (g):		5.70E-06	2.64E-07	5.97E-06	3.97E-08	N
Uncertainty in weight uranium leached (g):		5.76E-07	2.67E-08	5.77E-07	4.00E-09	
Equivalent number of leached kernels:		1.45E-02	6.71E-04	1.51E-02	1.01E-04	
Uncertainty in equivalent number of leached kernels:		1.47E-03	6.81E-05	1.47E-03	1.02E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the official Results of Analyses report for RMAL18079 on 2/07/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	1277, 1279, 1314, 1812, 1828
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B18012904	B18013004		W18013004	
Total volume of leach solution (ml):		46.9	47.0		49.0	
Radiochemical laboratory analysis number:		18079-004	18079-009		18079-014	
Measured uranium concentration (µg/ml):		1.13E-01	2.17E-02		8.79E-04	
Uncertainty in uranium concentration (µg/ml):		1.13E-02	2.17E-03		8.79E-05	
Weight uranium leached (g):		5.30E-06	1.02E-06	6.32E-06	4.31E-08	N
Uncertainty in weight uranium leached (g):		5.35E-07	1.03E-07	5.45E-07	4.34E-09	
Equivalent number of leached kernels:		1.35E-02	2.59E-03	1.60E-02	1.09E-04	
Uncertainty in equivalent number of leached kernels:		1.36E-03	2.63E-04	1.39E-03	1.11E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the official Results of Analyses report for RMAL18079 on 2/07/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	B&W J52R-16-14156C and B&W J52R-16-14156D
Compact lot description:	AGR-5/6/7 compacts, 25% packing fraction
Compact ID numbers:	Post-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14156C&D-Group 2_DRF26R3.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total
	Post-burn leach solution ID:	B18012905	B18013005	
	Total volume of leach solution (ml):	48.8	48.0	
	Radiochemical laboratory analysis number:	18079-005	18079-010	
	Measured uranium concentration (µg/ml):	3.14E-04	1.88E-04	
	Uncertainty in uranium concentration (µg/ml):	3.14E-05	1.88E-05	
	Weight uranium leached (g):	1.53E-08	9.02E-09	2.43E-08
	Uncertainty in weight uranium leached (g):	1.55E-09	9.11E-10	1.79E-09
	Equivalent number of leached kernels:	3.89E-05	2.29E-05	6.18E-05
	Uncertainty in equivalent number of leached kernels:	3.94E-06	2.32E-06	4.60E-06
Fe	Measured concentration (µg/ml):			**Fe**
	Total weight of leached impurity (µg):			
Cr	Measured concentration (µg/ml):			**Cr**
	Total weight of leached impurity (µg):			
Mn	Measured concentration (µg/ml):			**Mn**
	Total weight of leached impurity (µg):			
Co	Measured concentration (µg/ml):			**Co**
	Total weight of leached impurity (µg):			
Ni	Measured concentration (µg/ml):			**Ni**
	Total weight of leached impurity (µg):			
Ca	Measured concentration (µg/ml):			**Ca**
	Total weight of leached impurity (µg):			
Al	Measured concentration (µg/ml):			**Al**
	Total weight of leached impurity (µg):			
Ti	Measured concentration (µg/ml):			**Ti**
	Total weight of leached impurity (µg):			
V	Measured concentration (µg/ml):			**V**
	Total weight of leached impurity (µg):			

Comments

FCM checked the data against the official Results of Analyses report for RMAL18079 on 2/07/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

APPENDIX B. Report Forms for 40% Packing Fraction Compacts

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

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction

Compact ID numbers:	1021, 1042, 1056, 1093, 1105	1004, 1016, 1018, 1085, 1101	1006, 1057, 1068, 1078, 1107	1002, 1036, 1038, 1083, 1098	Mean	Standard Deviation
Number of compacts:	5	5	5	5		
Iron						
Pre-burn leach (DRF-26A) (µg):	102.24	114.25	122.92	119.03		
Post-burn leach (DRF-26B) (µg):	117.31	117.96	155.01	114.58		
Total leached (µg):	219.55	232.21	277.93	233.61		
Fe outside SiC (µg/compact):	**43.91**	**46.44**	**55.59**	**46.72**	**48.16**	**5.11**
Chromium						
Pre-burn leach (DRF-26A) (µg):	1.47	1.92	3.99	2.02		
Post-burn leach (DRF-26B) (µg):	1.05	0.77	0.90	0.83		
Total leached (µg):	2.52	2.69	4.89	2.85		
Cr outside SiC (µg/compact):	**0.50**	**0.54**	**0.98**	**0.57**	**0.65**	**0.22**
Manganese						
Pre-burn leach (DRF-26A) (µg):	1.29	1.42	1.31	1.42		
Post-burn leach (DRF-26B) (µg):	0.45	0.31	0.33	0.37		
Total leached (µg):	1.75	1.73	1.64	1.78		
Mn outside SiC (µg/compact):	**0.35**	**0.35**	**0.33**	**0.36**	**0.345**	**0.013**
Cobalt						
Pre-burn leach (DRF-26A) (µg):	0.03	0.06	0.04	0.04		
Post-burn leach (DRF-26B) (µg):	0.05	0.06	0.08	0.05		
Total leached (µg):	0.09	0.11	0.12	0.09		
Co outside SiC (µg/compact):	**0.017**	**0.023**	**0.025**	**0.018**	**0.021**	**0.004**
Nickel						
Pre-burn leach (DRF-26A) (µg):	2.92	5.73	4.05	8.51		
Post-burn leach (DRF-26B) (µg):	2.85	2.57	3.38	2.75		
Total leached (µg):	5.77	8.30	7.43	11.25		
Ni outside SiC (µg/compact):	**1.15**	**1.66**	**1.49**	**2.25**	**1.64**	**0.46**
Transition Metals						
Cr+Mn+Co+Ni outside SiC (µg/compact):	**2.03**	**2.57**	**2.82**	**3.20**	**2.65**	**0.49**
Calcium						
Pre-burn leach (DRF-26A) (µg):	532.64	567.86	491.77	489.92		
Post-burn leach (DRF-26B) (µg):	48.50	58.77	45.46	50.55		
Total leached (µg):	581.15	626.63	537.23	540.47		
Ca outside SiC (µg/compact):	**116.23**	**125.33**	**107.45**	**108.09**	**114.27**	**8.38**
Aluminum						
Pre-burn leach (DRF-26A) (µg):	604.67	606.05	573.87	595.01		
Post-burn leach (DRF-26B) (µg):	87.93	63.66	66.78	81.06		
Total leached (µg):	692.59	669.71	640.65	676.07		
Al outside SiC (µg/compact):	**138.52**	**133.94**	**128.13**	**135.21**	**133.95**	**4.33**
Titanium						
Pre-burn leach (DRF-26A) (µg):	21.57	19.58	24.84	28.18		
Post-burn leach (DRF-26B) (µg):	29.17	26.65	22.17	21.10		
Total leached (µg):	50.74	46.23	47.01	49.28		
Ti outside SiC (µg/compact):	**10.15**	**9.25**	**9.40**	**9.86**	**9.66**	**0.41**
Vanadium						
Pre-burn leach (DRF-26A) (µg):	15.10	16.29	15.81	16.51		
Post-burn leach (DRF-26B) (µg):	13.02	11.04	11.55	11.38		
Total leached (µg):	28.13	27.33	27.36	27.90		
V outside SiC (µg/compact):	**5.63**	**5.47**	**5.47**	**5.58**	**5.54**	**0.08**
Titanium and Vanadium						
Ti + V outside SiC (µg/compact):	**15.77**	**14.71**	**14.87**	**15.43**	**15.20**	**0.49**

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-C: Summary of Pre-burn Leach Uranium

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction

Compact ID numbers:	1009, 1015, 1059, 1065, 1069	1013, 1026, 1029, 1066, 1071	1054, 1062, 1089, 1096, 1097	1023, 1040, 1048, 1084, 1088	Total
Number of compacts:	5	5	5	5	20
Equivalent number of leached kernels:	2.1E+00	3.1E+00	2.0E+00	2.7E+00	1.0E+01

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-C: Summary of Pre-burn Leach Uranium

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction

Compact ID numbers:	1021, 1042, 1056, 1093, 1105	1004, 1016, 1018, 1085, 1101	1006, 1057, 1068, 1078, 1107	1002, 1036, 1038, 1083, 1098	Total
Number of compacts:	5	5	5	5	20
Equivalent number of leached kernels:	3.3E-02	4.6E-02	1.1E+00	3.2E-02	1.2E+00

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-D: Summary of Post-Burn Leach Uranium

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction

Compact ID numbers:	1009, 1015, 1059, 1065, 1069	1013, 1026, 1029, 1066, 1071	1054, 1062, 1089, 1096, 1097	1023, 1040, 1048, 1084, 1088	Total
Number of compacts:	5	5	5	5	20
Equivalent number of leached kernels:	1.0E+00	8.6E-02	8.4E-01	1.0E+00	3.0E+00

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-D: Summary of Post-Burn Leach Uranium

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction

Compact ID numbers:	1021, 1042, 1056, 1093, 1105	1004, 1016, 1018, 1085, 1101	1006, 1057, 1068, 1078, 1107	1002, 1036, 1038, 1083, 1098	Total
Number of compacts:	5	5	5	5	20
Equivalent number of leached kernels:	3.8E-02	3.2E-02	1.1E+00	3.5E-02	1.2E+00

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1009, 1015, 1059, 1065, 1069
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17110801	L17110901		W17111001	
Total volume of leach solution (ml):		156.0	91.0		150.0	
Radiochemical laboratory analysis number:		17812-001	17812-006		17812-011	
Measured uranium concentration (µg/ml):		4.93E+00	5.99E-01		7.97E-02	
Uncertainty in uranium concentration (µg/ml):		4.93E-01	5.99E-02		7.97E-03	
Weight uranium leached (g):		7.69E-04	5.45E-05	8.36E-04	1.20E-05	Y
Uncertainty in weight uranium leached (g):		7.70E-05	5.46E-06	7.72E-05	1.20E-06	
Equivalent number of leached kernels:		1.95E+00	1.38E-01	2.12E+00	3.03E-02	
Uncertainty in equivalent number of leached kernels:		1.96E-01	1.39E-02	1.97E-01	3.05E-03	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17812 on 1/31/2018.

Fred C. Montgomery
Operator

2-6-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1013, 1026, 1029, 1066, 1071
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17110802	L17110902		W17111002	
Total volume of leach solution (ml):		138.0	113.0		142.0	
Radiochemical laboratory analysis number:		17812-002	17812-007		17812-012	
Measured uranium concentration (µg/ml):		2.44E+00	6.59E+00		8.93E-01	
Uncertainty in uranium concentration (µg/ml):		2.44E-01	6.59E-01		8.93E-02	
Weight uranium leached (g):		3.37E-04	7.45E-04	1.21E-03	1.27E-04	Y
Uncertainty in weight uranium leached (g):		3.37E-05	7.46E-05	8.28E-05	1.27E-05	
Equivalent number of leached kernels:		8.55E-01	1.89E+00	3.07E+00	3.22E-01	
Uncertainty in equivalent number of leached kernels:		8.60E-02	1.90E-01	2.12E-01	3.24E-02	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17812 on 1/31/2018.

Fred C. Montgomery
Operator

2-6-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1054, 1062, 1089, 1096, 1097
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17110803	L17110903		W17111003	
	Total volume of leach solution (ml):	131.0	92.0		160.0	
	Radiochemical laboratory analysis number:	17812-003	17812-008		17812-013	
	Measured uranium concentration (µg/ml):	5.47E+00	7.96E-01		9.34E-02	
	Uncertainty in uranium concentration (µg/ml):	5.47E-01	7.96E-02		9.34E-03	
	Weight uranium leached (g):	7.17E-04	7.32E-05	8.05E-04	1.49E-05	Y
	Uncertainty in weight uranium leached (g):	7.17E-05	7.34E-06	7.21E-05	1.50E-06	
	Equivalent number of leached kernels:	1.82E+00	1.86E-01	2.04E+00	3.79E-02	
	Uncertainty in equivalent number of leached kernels:	1.83E-01	1.87E-02	1.84E-01	3.81E-03	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17812 on 1/31/2018.

Fred C. Montgomery — Operator

2-6-2018 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1023, 1040, 1048, 1084, 1088
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17110804	L17110904		W17111004	
Total volume of leach solution (ml):		133.0	117.0		137.0	
Radiochemical laboratory analysis number:		17812-004	17812-009		17812-004	
Measured uranium concentration (µg/ml):		7.33E+00	8.19E-01		8.02E-02	
Uncertainty in uranium concentration (µg/ml):		7.33E-01	8.19E-02		8.02E-03	
Weight uranium leached (g):		9.75E-04	9.58E-05	1.08E-03	1.10E-05	Y
Uncertainty in weight uranium leached (g):		9.76E-05	9.60E-06	9.81E-05	1.10E-06	
Equivalent number of leached kernels:		2.47E+00	2.43E-01	2.75E+00	2.79E-02	
Uncertainty in equivalent number of leached kernels:		2.49E-01	2.45E-02	2.50E-01	2.81E-03	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17812 on 1/31/2018.

Fred C. Montgomery — Operator

2-6-2018 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	Pre-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17110805	L17110905		W17111005	
	Total volume of leach solution (ml):	177.0	93.0		61.0	
	Radiochemical laboratory analysis number:	17812-005	17812-010		17812-015	
	Measured uranium concentration (µg/ml):	7.81E-04	9.35E-04		<4.00E-05	
	Uncertainty in uranium concentration (µg/ml):	7.81E-05	9.35E-05			
	Weight uranium leached (g):	1.38E-07	8.70E-08	2.25E-07	<2.44E-09	N
	Uncertainty in weight uranium leached (g):	1.38E-08	8.72E-09	1.64E-08		
	Equivalent number of leached kernels:	3.51E-04	2.21E-04	5.72E-04	6.19E-06	
	Uncertainty in equivalent number of leached kernels:	3.53E-05	2.22E-05	4.19E-05		
Fe	Measured concentration (µg/ml):			Fe		
	Total weight of leached impurity (µg):					
Cr	Measured concentration (µg/ml):			Cr		
	Total weight of leached impurity (µg):					
Mn	Measured concentration (µg/ml):			Mn		
	Total weight of leached impurity (µg):					
Co	Measured concentration (µg/ml):			Co		
	Total weight of leached impurity (µg):					
Ni	Measured concentration (µg/ml):			Ni		
	Total weight of leached impurity (µg):					
Ca	Measured concentration (µg/ml):			Ca		
	Total weight of leached impurity (µg):					
Al	Measured concentration (µg/ml):			Al		
	Total weight of leached impurity (µg):					
Ti	Measured concentration (µg/ml):			Ti		
	Total weight of leached impurity (µg):					
V	Measured concentration (µg/ml):			V		
	Total weight of leached impurity (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17812 on 1/31/2018.

Fred C. Montgomery — Operator

2-6-2018 — Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1009, 1015, 1059, 1065, 1069
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17112801	B17113001		W17113001	
	Total volume of leach solution (ml):	48.0	50.0		25.0	
	Radiochemical laboratory analysis number:	17858-001	17858-006		17858-011	
	Measured uranium concentration (µg/ml):	8.45E+00	6.58E-02		2.18E-03	
	Uncertainty in uranium concentration (µg/ml):	8.45E-01	6.25E-03		2.18E-04	
	Weight uranium leached (g):	4.06E-04	3.29E-06	4.09E-04	5.45E-08	N
	Uncertainty in weight uranium leached (g):	4.09E-05	3.15E-07	4.09E-05	5.63E-09	
	Equivalent number of leached kernels:	1.03E+00	8.35E-03	1.04E+00	1.38E-04	
	Uncertainty in equivalent number of leached kernels:	1.04E-01	8.05E-04	1.04E-01	1.44E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17858 on 1/31/2018.

Fred C. Montgomery
Operator

2-6-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1013, 1026, 1029, 1066, 1071
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17112802	B17113002		W17113002	
	Total volume of leach solution (ml):	54.0	53.0		17.5	
	Radiochemical laboratory analysis number:	17858-002	17858-007		17858-012	
	Measured uranium concentration (µg/ml):	5.91E-01	3.82E-02		4.73E-03	
	Uncertainty in uranium concentration (µg/ml):	5.91E-02	3.82E-03		4.73E-04	
	Weight uranium leached (g):	3.19E-05	2.02E-06	3.39E-05	8.28E-08	N
	Uncertainty in weight uranium leached (g):	3.21E-06	2.04E-07	3.22E-06	8.83E-09	
	Equivalent number of leached kernels:	8.10E-02	5.14E-03	8.61E-02	2.10E-04	
	Uncertainty in equivalent number of leached kernels:	8.20E-03	5.20E-04	8.22E-03	2.25E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17858 on 1/31/2018.

Fred C. Montgomery
Operator

2-6-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1054, 1062, 1089, 1096, 1097
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17112803	B17113003		W17113003	
	Total volume of leach solution (ml):	53.0	47.0		19.0	
	Radiochemical laboratory analysis number:	17858-003	17858-008		17858-013	
	Measured uranium concentration (µg/ml):	6.15E+00	1.03E-01		5.06E-03	
	Uncertainty in uranium concentration (µg/ml):	6.15E-01	1.03E-02		5.06E-04	
	Weight uranium leached (g):	3.26E-04	4.84E-06	3.31E-04	9.61E-08	N
	Uncertainty in weight uranium leached (g):	3.28E-05	4.89E-07	3.28E-05	1.02E-08	
	Equivalent number of leached kernels:	8.27E-01	1.23E-02	8.40E-01	2.44E-04	
	Uncertainty in equivalent number of leached kernels:	8.38E-02	1.25E-03	8.38E-02	2.59E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17858 on 1/31/2018.

Fred C. Montgomery — Operator

2-6-2018 — Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1023, 1040, 1048, 1084, 1088
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17112804	B17113004		W17113004	
Total volume of leach solution (ml):		50.0	49.0		19.0	
Radiochemical laboratory analysis number:		17858-004	17858-009		17858-014	
Measured uranium concentration (µg/ml):		5.70E+00	2.55E+00		7.67E-02	
Uncertainty in uranium concentration (µg/ml):		5.70E-01	2.55E-01		7.67E-03	
Weight uranium leached (g):		2.85E-04	1.25E-04	4.10E-04	1.46E-06	N
Uncertainty in weight uranium leached (g):		2.87E-05	1.26E-05	3.14E-05	1.54E-07	
Equivalent number of leached kernels:		7.23E-01	3.17E-01	1.04E+00	3.70E-03	
Uncertainty in equivalent number of leached kernels:		7.33E-02	3.21E-02	8.03E-02	3.93E-04	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17858 on 1/31/2018.

Fred C. Montgomery
Operator

2-6-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	Post-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 1_DRF26R3.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	L17112805	L17113005		W17113005	
	Total volume of leach solution (ml):	47.0	50.0		21.0	
	Radiochemical laboratory analysis number:	17858-005	17858-010		17858-015	
	Measured uranium concentration (µg/ml):	2.16E-03	5.66E-04		4.27E-04	
	Uncertainty in uranium concentration (µg/ml):	2.16E-04	5.66E-05		4.27E-05	
	Weight uranium leached (g):	1.02E-07	2.83E-08	1.30E-07	8.97E-09	N
	Uncertainty in weight uranium leached (g):	1.02E-08	2.85E-09	1.06E-08	9.39E-10	
	Equivalent number of leached kernels:	2.58E-04	7.18E-05	3.29E-04	2.28E-05	
	Uncertainty in equivalent number of leached kernels:	2.61E-05	7.28E-06	2.72E-05	2.39E-06	
Fe	Measured concentration (µg/ml):			Fe		
	Total weight of leached impurity (µg):					
Cr	Measured concentration (µg/ml):			Cr		
	Total weight of leached impurity (µg):					
Mn	Measured concentration (µg/ml):			Mn		
	Total weight of leached impurity (µg):					
Co	Measured concentration (µg/ml):			Co		
	Total weight of leached impurity (µg):					
Ni	Measured concentration (µg/ml):			Ni		
	Total weight of leached impurity (µg):					
Ca	Measured concentration (µg/ml):			Ca		
	Total weight of leached impurity (µg):					
Al	Measured concentration (µg/ml):			Al		
	Total weight of leached impurity (µg):					
Ti	Measured concentration (µg/ml):			Ti		
	Total weight of leached impurity (µg):					
V	Measured concentration (µg/ml):			V		
	Total weight of leached impurity (µg):					

Comments

FCM checked the recorded data against the official Results of Analysis for RMAL17858 on 1/31/2018.

Fred C. Montgomery — Operator

2-6-2018 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1021, 1042, 1056, 1093, 1105
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17112001	L17112201			
	Total volume of leach solution (ml):	118.0	159.0			
	Radiochemical laboratory analysis number:	17843-001	17843-006			
	Measured uranium concentration (µg/ml):	9.20E-02	1.42E-02			
	Uncertainty in uranium concentration (µg/ml):	9.20E-03	1.42E-03			
	Weight uranium leached (g):	1.09E-05	2.26E-06	1.31E-05		
	Uncertainty in weight uranium leached (g):	1.09E-06	2.26E-07	1.11E-06		
	Equivalent number of leached kernels:	2.76E-02	5.73E-03	3.33E-02		
	Uncertainty in equivalent number of leached kernels:	2.77E-03	5.76E-04	2.84E-03		
Fe	Measured concentration of impurity in sample (µg/ml):	8.20E-01	1.31E-01	Fe		
	Uncorrected weight of impurity in sample (µg):	96.76	20.83	117.59		
	Weight of impurity in blank (µg):	6.47	8.88			
	Minimum corrected weight of impurity in sample (µg):	90.29	11.95	102.24		
	Maximum corrected weight of impurity in sample (µg):	90.29	11.95	102.24		
Cr	Measured concentration of impurity in sample (µg/ml):	1.18E-02	2.96E-03	Cr		
	Uncorrected weight of impurity in sample (µg):	1.39	0.47	1.86		
	Weight of impurity in blank (µg):	< 0.38	0.39			
	Minimum corrected weight of impurity in sample (µg):	1.01	0.08	1.08		
	Maximum corrected weight of impurity in sample (µg):	1.39	0.08	1.47		
Mn	Measured concentration of impurity in sample (µg/ml):	1.14E-02	1.85E-03	Mn		
	Uncorrected weight of impurity in sample (µg):	1.35	0.29	1.64		
	Weight of impurity in blank (µg):	0.15	0.20			
	Minimum corrected weight of impurity in sample (µg):	1.20	0.10	1.29		
	Maximum corrected weight of impurity in sample (µg):	1.20	0.10	1.29		
Co	Measured concentration of impurity in sample (µg/ml):	3.74E-04	5.92E-05	Co		
	Uncorrected weight of impurity in sample (µg):	0.04	0.01	0.05		
	Weight of impurity in blank (µg):	0.02	< 0.01			
	Minimum corrected weight of impurity in sample (µg):	0.02	0.00	0.02		
	Maximum corrected weight of impurity in sample (µg):	0.02	0.01	0.03		
Ni	Measured concentration of impurity in sample (µg/ml):	1.43E-02	7.77E-03	Ni		
	Uncorrected weight of impurity in sample (µg):	1.69	1.24	2.92		
	Weight of impurity in blank (µg):	< 0.98	< 0.97			
	Minimum corrected weight of impurity in sample (µg):	0.71	0.27	0.98		
	Maximum corrected weight of impurity in sample (µg):	1.69	1.24	2.92		
Ca	Measured concentration of impurity in sample (µg/ml):	3.63E+00	6.56E-01	Ca		
	Uncorrected weight of impurity in sample (µg):	428.34	104.30	532.64		
	Weight of impurity in blank (µg):	<43.96	<43.62			
	Minimum corrected weight of impurity in sample (µg):	384.38	60.68	445.07		
	Maximum corrected weight of impurity in sample (µg):	428.34	104.30	532.64		
Al	Measured concentration of impurity in sample (µg/ml):	4.30E+00	7.25E-01	Al		
	Uncorrected weight of impurity in sample (µg):	507.40	115.28	622.68		
	Weight of impurity in blank (µg):	9.44	8.57			
	Minimum corrected weight of impurity in sample (µg):	497.96	106.71	604.67		
	Maximum corrected weight of impurity in sample (µg):	497.96	106.71	604.67		
Ti	Measured concentration of impurity in sample (µg/ml):	8.62E-02	7.17E-02	Ti		
	Uncorrected weight of impurity in sample (µg):	10.17	11.40	21.57		
	Weight of impurity in blank (µg):	< 0.70	< 0.69			
	Minimum corrected weight of impurity in sample (µg):	9.47	10.71	20.18		
	Maximum corrected weight of impurity in sample (µg):	10.17	11.40	21.57		
V	Measured concentration of impurity in sample (µg/ml):	9.89E-02	2.16E-02	V		
	Uncorrected weight of impurity in sample (µg):	11.67	3.43	15.10		
	Weight of impurity in blank (µg):	< 0.02	< 0.02			
	Minimum corrected weight of impurity in sample (µg):	11.65	3.42	15.07		
	Maximum corrected weight of impurity in sample (µg):	11.67	3.43	15.10		

Comments

Water rinse not analyzed.
FCM checked the data against the official results of RMAL17843 on 2/5/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1004, 1016, 1018, 1085, 1101
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17112002	L17112202			
	Total volume of leach solution (ml):	121.0	154.0			
	Radiochemical laboratory analysis number:	17843-002	17843-007			
	Measured uranium concentration (µg/ml):	1.26E-01	1.75E-02			
	Uncertainty in uranium concentration (µg/ml):	1.26E-02	1.75E-03			
	Weight uranium leached (g):	1.52E-05	2.70E-06	1.79E-05		
	Uncertainty in weight uranium leached (g):	1.53E-06	2.70E-07	1.55E-06		
	Equivalent number of leached kernels:	3.87E-02	6.84E-03	4.55E-02		
	Uncertainty in equivalent number of leached kernels:	3.89E-03	6.88E-04	3.96E-03		
Fe	Measured concentration of impurity in sample (µg/ml):	8.98E-01	1.36E-01	**Fe**		
	Uncorrected weight of impurity in sample (µg):	108.66	20.94	129.60		
	Weight of impurity in blank (µg):	6.47	8.88			
	Minimum corrected weight of impurity in sample (µg):	102.19	12.06	114.25		
	Maximum corrected weight of impurity in sample (µg):	102.19	12.06	114.25		
Cr	Measured concentration of impurity in sample (µg/ml):	1.37E-02	4.29E-03	**Cr**		
	Uncorrected weight of impurity in sample (µg):	1.66	0.66	2.32		
	Weight of impurity in blank (µg):	< 0.38	0.39			
	Minimum corrected weight of impurity in sample (µg):	1.27	0.27	1.54		
	Maximum corrected weight of impurity in sample (µg):	1.66	0.27	1.92		
Mn	Measured concentration of impurity in sample (µg/ml):	1.21E-02	1.98E-03	**Mn**		
	Uncorrected weight of impurity in sample (µg):	1.46	0.30	1.77		
	Weight of impurity in blank (µg):	0.15	0.20			
	Minimum corrected weight of impurity in sample (µg):	1.31	0.11	1.42		
	Maximum corrected weight of impurity in sample (µg):	1.31	0.11	1.42		
Co	Measured concentration of impurity in sample (µg/ml):	5.22E-04	8.52E-05	**Co**		
	Uncorrected weight of impurity in sample (µg):	0.06	0.01	0.08		
	Weight of impurity in blank (µg):	0.02	< 0.01			
	Minimum corrected weight of impurity in sample (µg):	0.04	0.00	0.05		
	Maximum corrected weight of impurity in sample (µg):	0.04	0.01	0.06		
Ni	Measured concentration of impurity in sample (µg/ml):	3.39E-02	1.06E-02	**Ni**		
	Uncorrected weight of impurity in sample (µg):	4.10	1.63	5.73		
	Weight of impurity in blank (µg):	< 0.98	< 0.97			
	Minimum corrected weight of impurity in sample (µg):	3.13	0.66	3.79		
	Maximum corrected weight of impurity in sample (µg):	4.10	1.63	5.73		
Ca	Measured concentration of impurity in sample (µg/ml):	3.68E+00	7.96E-01	**Ca**		
	Uncorrected weight of impurity in sample (µg):	445.28	122.58	567.86		
	Weight of impurity in blank (µg):	<43.96	<43.62			
	Minimum corrected weight of impurity in sample (µg):	401.32	78.96	480.29		
	Maximum corrected weight of impurity in sample (µg):	445.28	122.58	567.86		
Al	Measured concentration of impurity in sample (µg/ml):	4.32E+00	6.58E-01	**Al**		
	Uncorrected weight of impurity in sample (µg):	522.72	101.33	624.05		
	Weight of impurity in blank (µg):	9.44	8.57			
	Minimum corrected weight of impurity in sample (µg):	513.28	92.76	606.05		
	Maximum corrected weight of impurity in sample (µg):	513.28	92.76	606.05		
Ti	Measured concentration of impurity in sample (µg/ml):	8.34E-02	6.16E-02	**Ti**		
	Uncorrected weight of impurity in sample (µg):	10.09	9.49	19.58		
	Weight of impurity in blank (µg):	< 0.70	< 0.69			
	Minimum corrected weight of impurity in sample (µg):	9.39	8.79	18.19		
	Maximum corrected weight of impurity in sample (µg):	10.09	9.49	19.58		
V	Measured concentration of impurity in sample (µg/ml):	1.06E-01	2.25E-02	**V**		
	Uncorrected weight of impurity in sample (µg):	12.83	3.47	16.29		
	Weight of impurity in blank (µg):	< 0.02	< 0.02			
	Minimum corrected weight of impurity in sample (µg):	12.81	3.45	16.26		
	Maximum corrected weight of impurity in sample (µg):	12.83	3.47	16.29		

Comments

Water rinse not analyzed.
FCM checked the data against the official results of RMAL17843 on 2/5/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1006, 1057, 1068, 1078, 1107
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17112003	L17112203			
	Total volume of leach solution (ml):	119.0	147.0			
	Radiochemical laboratory analysis number:	17843-003	17843-008			
	Measured uranium concentration (µg/ml):	3.09E+00	4.08E-01			
	Uncertainty in uranium concentration (µg/ml):	3.09E-01	4.08E-02			
	Weight uranium leached (g):	3.68E-04	6.00E-05	4.28E-04		
	Uncertainty in weight uranium leached (g):	3.68E-05	6.00E-06	3.73E-05		
	Equivalent number of leached kernels:	9.33E-01	1.52E-01	1.09E+00		
	Uncertainty in equivalent number of leached kernels:	9.39E-02	1.53E-02	9.53E-02		
Fe	Measured concentration of impurity in sample (µg/ml):	9.47E-01	1.74E-01	**Fe**		
	Uncorrected weight of impurity in sample (µg):	112.69	25.58	138.27		
	Weight of impurity in blank (µg):	6.47	8.88			
	Minimum corrected weight of impurity in sample (µg):	106.23	16.70	122.92		
	Maximum corrected weight of impurity in sample (µg):	106.23	16.70	122.92		
Cr	Measured concentration of impurity in sample (µg/ml):	2.70E-02	7.95E-03	**Cr**		
	Uncorrected weight of impurity in sample (µg):	3.21	1.17	4.38		
	Weight of impurity in blank (µg):	< 0.38	0.39			
	Minimum corrected weight of impurity in sample (µg):	2.83	0.77	3.60		
	Maximum corrected weight of impurity in sample (µg):	3.21	0.77	3.99		
Mn	Measured concentration of impurity in sample (µg/ml):	1.12E-02	2.20E-03	**Mn**		
	Uncorrected weight of impurity in sample (µg):	1.33	0.32	1.66		
	Weight of impurity in blank (µg):	0.15	0.20			
	Minimum corrected weight of impurity in sample (µg):	1.18	0.13	1.31		
	Maximum corrected weight of impurity in sample (µg):	1.18	0.13	1.31		
Co	Measured concentration of impurity in sample (µg/ml):	4.29E-04	7.76E-05	**Co**		
	Uncorrected weight of impurity in sample (µg):	0.05	0.01	0.06		
	Weight of impurity in blank (µg):	0.02	< 0.01			
	Minimum corrected weight of impurity in sample (µg):	0.03	0.00	0.03		
	Maximum corrected weight of impurity in sample (µg):	0.03	0.01	0.04		
Ni	Measured concentration of impurity in sample (µg/ml):	2.49E-02	< 7.40E-03	**Ni**		
	Uncorrected weight of impurity in sample (µg):	2.96	< 1.09	< 4.05		
	Weight of impurity in blank (µg):	< 0.98	< 0.97			
	Minimum corrected weight of impurity in sample (µg):	1.99	0.00	1.99		
	Maximum corrected weight of impurity in sample (µg):	2.96	1.09	4.05		
Ca	Measured concentration of impurity in sample (µg/ml):	3.40E+00	5.93E-01	**Ca**		
	Uncorrected weight of impurity in sample (µg):	404.60	87.17	491.77		
	Weight of impurity in blank (µg):	<43.96	<43.62			
	Minimum corrected weight of impurity in sample (µg):	360.64	43.55	404.19		
	Maximum corrected weight of impurity in sample (µg):	404.60	87.17	491.77		
Al	Measured concentration of impurity in sample (µg/ml):	4.03E+00	7.64E-01	**Al**		
	Uncorrected weight of impurity in sample (µg):	479.57	112.31	591.88		
	Weight of impurity in blank (µg):	9.44	8.57			
	Minimum corrected weight of impurity in sample (µg):	470.13	103.74	573.87		
	Maximum corrected weight of impurity in sample (µg):	470.13	103.74	573.87		
Ti	Measured concentration of impurity in sample (µg/ml):	9.99E-02	8.81E-02	**Ti**		
	Uncorrected weight of impurity in sample (µg):	11.89	12.95	24.84		
	Weight of impurity in blank (µg):	< 0.70	< 0.69			
	Minimum corrected weight of impurity in sample (µg):	11.19	12.26	23.45		
	Maximum corrected weight of impurity in sample (µg):	11.89	12.95	24.84		
V	Measured concentration of impurity in sample (µg/ml):	1.02E-01	2.50E-02	**V**		
	Uncorrected weight of impurity in sample (µg):	12.14	3.68	15.81		
	Weight of impurity in blank (µg):	< 0.02	< 0.02			
	Minimum corrected weight of impurity in sample (µg):	12.12	3.66	15.78		
	Maximum corrected weight of impurity in sample (µg):	12.14	3.68	15.81		

Comments

Water rinse not analyzed.
FCM checked the data against the official results of RMAL17843 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1002, 1036, 1038, 1083, 1098
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17112004	L17112204			
	Total volume of leach solution (ml):	116.0	140.0			
	Radiochemical laboratory analysis number:	17843-004	17843-009			
	Measured uranium concentration (µg/ml):	8.84E-02	1.79E-02			
	Uncertainty in uranium concentration (µg/ml):	8.84E-03	1.79E-03			
	Weight uranium leached (g):	1.03E-05	2.51E-06	1.28E-05		
	Uncertainty in weight uranium leached (g):	1.03E-06	2.51E-07	1.06E-06		
	Equivalent number of leached kernels:	2.60E-02	6.36E-03	3.24E-02		
	Uncertainty in equivalent number of leached kernels:	2.62E-03	6.40E-04	2.70E-03		
Fe	Measured concentration of impurity in sample (µg/ml):	9.46E-01	1.76E-01	**Fe**		
	Uncorrected weight of impurity in sample (µg):	109.74	24.64	134.38		
	Weight of impurity in blank (µg):	6.47	8.88			
	Minimum corrected weight of impurity in sample (µg):	103.27	15.76	119.03		
	Maximum corrected weight of impurity in sample (µg):	103.27	15.76	119.03		
Cr	Measured concentration of impurity in sample (µg/ml):	1.39E-02	5.73E-03	**Cr**		
	Uncorrected weight of impurity in sample (µg):	1.61	0.80	2.41		
	Weight of impurity in blank (µg):	< 0.38	0.39			
	Minimum corrected weight of impurity in sample (µg):	1.23	0.41	1.64		
	Maximum corrected weight of impurity in sample (µg):	1.61	0.41	2.02		
Mn	Measured concentration of impurity in sample (µg/ml):	1.20E-02	2.65E-03	**Mn**		
	Uncorrected weight of impurity in sample (µg):	1.39	0.37	1.76		
	Weight of impurity in blank (µg):	0.15	0.20			
	Minimum corrected weight of impurity in sample (µg):	1.24	0.17	1.42		
	Maximum corrected weight of impurity in sample (µg):	1.24	0.17	1.42		
Co	Measured concentration of impurity in sample (µg/ml):	4.18E-04	9.00E-05	**Co**		
	Uncorrected weight of impurity in sample (µg):	0.05	0.01	0.06		
	Weight of impurity in blank (µg):	0.02	< 0.01			
	Minimum corrected weight of impurity in sample (µg):	0.03	0.00	0.03		
	Maximum corrected weight of impurity in sample (µg):	0.03	0.01	0.04		
Ni	Measured concentration of impurity in sample (µg/ml):	6.44E-02	< 7.40E-03	**Ni**		
	Uncorrected weight of impurity in sample (µg):	7.47	< 1.04	< 8.51		
	Weight of impurity in blank (µg):	< 0.98	< 0.97			
	Minimum corrected weight of impurity in sample (µg):	6.49	0.00	6.49		
	Maximum corrected weight of impurity in sample (µg):	7.47	1.04	8.51		
Ca	Measured concentration of impurity in sample (µg/ml):	3.48E+00	6.16E-01	**Ca**		
	Uncorrected weight of impurity in sample (µg):	403.68	86.24	489.92		
	Weight of impurity in blank (µg):	<43.96	<43.62			
	Minimum corrected weight of impurity in sample (µg):	359.72	42.62	402.34		
	Maximum corrected weight of impurity in sample (µg):	403.68	86.24	489.92		
Al	Measured concentration of impurity in sample (µg/ml):	4.33E+00	7.91E-01	**Al**		
	Uncorrected weight of impurity in sample (µg):	502.28	110.74	613.02		
	Weight of impurity in blank (µg):	9.44	8.57			
	Minimum corrected weight of impurity in sample (µg):	492.84	102.17	595.01		
	Maximum corrected weight of impurity in sample (µg):	492.84	102.17	595.01		
Ti	Measured concentration of impurity in sample (µg/ml):	1.21E-01	1.01E-01	**Ti**		
	Uncorrected weight of impurity in sample (µg):	14.04	14.14	28.18		
	Weight of impurity in blank (µg):	< 0.70	< 0.69			
	Minimum corrected weight of impurity in sample (µg):	13.34	13.45	26.78		
	Maximum corrected weight of impurity in sample (µg):	14.04	14.14	28.18		
V	Measured concentration of impurity in sample (µg/ml):	1.10E-01	2.68E-02	**V**		
	Uncorrected weight of impurity in sample (µg):	12.76	3.75	16.51		
	Weight of impurity in blank (µg):	< 0.02	< 0.02			
	Minimum corrected weight of impurity in sample (µg):	12.74	3.73	16.48		
	Maximum corrected weight of impurity in sample (µg):	12.76	3.75	16.51		

Comments

Water rinse not analyzed.
FCM checked the data against the official results of RMAL17843 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	Pre-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17112005	L17112205			
	Total volume of leach solution (ml):	132.0	131.0			
	Radiochemical laboratory analysis number:	17843-005	17843-010			
	Measured uranium concentration (µg/ml):	3.21E-04	4.56E-04			
	Uncertainty in uranium concentration (µg/ml):	3.21E-05	4.56E-05			
	Weight uranium leached (g):	4.24E-08	5.97E-08	1.02E-07		
	Uncertainty in weight uranium leached (g):	4.24E-09	5.98E-09	7.33E-09		
	Equivalent number of leached kernels:	1.08E-04	1.52E-04	2.59E-04		
	Uncertainty in equivalent number of leached kernels:	1.08E-05	1.53E-05	1.88E-05		
Fe	Measured concentration (µg/ml):	4.90E-02	6.78E-02	Fe		
	Total weight of leached impurity (µg):	6.47	8.88	15.35		
Cr	Measured concentration (µg/ml):	< 2.91E-03	3.01E-03	Cr		
	Total weight of leached impurity (µg):	< 0.38	0.39	< 0.78		
Mn	Measured concentration (µg/ml):	1.13E-03	1.51E-03	Mn		
	Total weight of leached impurity (µg):	0.15	0.20	0.35		
Co	Measured concentration (µg/ml):	6.55E-04	2.49E-03	Co		
	Total weight of leached impurity (µg):	0.02	< 0.01	< 0.03		
Ni	Measured concentration (µg/ml):	< 7.40E-03	< 7.40E-03	Ni		
	Total weight of leached impurity (µg):	< 0.98	< 0.97	< 1.95		
Ca	Measured concentration (µg/ml):	< 3.33E-01	< 3.33E-01	Ca		
	Total weight of leached impurity (µg):	<43.96	<43.62	<87.58		
Al	Measured concentration (µg/ml):	7.15E-02	6.54E-02	Al		
	Total weight of leached impurity (µg):	9.44	8.57	18.01		
Ti	Measured concentration (µg/ml):	< 5.29E-03	< 5.29E-03	Ti		
	Total weight of leached impurity (µg):	< 0.70	< 0.69	< 1.39		
V	Measured concentration (µg/ml):	< 1.33E-04	< 1.33E-04	V		
	Total weight of leached impurity (µg):	< 0.02	< 0.02	< 0.03		

Comments

Water rinse not analyzed.
FCM checked the data against the official results of RMAL17843 on 2/5/2018.
Cobalt values for this Blank sample were an artifact of contamination introduced during analysis. Reported values for 1st and 2nd leach of 0.09 µg and 0.33 µg, respectively, were replaced with typical values 0.02 and <0.01.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1021, 1042, 1056, 1093, 1105
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17120501	B17120801		W17120801	
	Total volume of leach solution (ml):	47.0	50.0		25.0	
	Radiochemical laboratory analysis number:	17875-001	17875-006		17875-011	
	Measured uranium concentration (µg/ml):	3.10E-01	5.72E-03		1.40E-03	
	Uncertainty in uranium concentration (µg/ml):	3.10E-02	5.72E-04		1.40E-04	
	Weight uranium leached (g):	1.46E-05	2.86E-07	1.49E-05	3.50E-08	N
	Uncertainty in weight uranium leached (g):	1.47E-06	2.88E-08	1.47E-06	3.62E-09	
	Equivalent number of leached kernels:	3.70E-02	7.26E-04	3.77E-02	8.88E-05	
	Uncertainty in equivalent number of leached kernels:	3.75E-03	7.36E-05	3.75E-03	9.22E-06	
Fe	Measured concentration of impurity in sample (µg/ml):	2.38E+00	< 1.09E-01	**Fe**	< 1.09E-01	
	Uncorrected weight of impurity in sample (µg):	111.86	< 5.45	<117.31	< 2.73	N
	Weight of impurity in blank (µg):	< 5.23	< 5.56		< 1.96	
	Minimum corrected weight of impurity in sample (µg):	106.63	0.00	106.63	0.00	
	Maximum corrected weight of impurity in sample (µg):	111.86	5.45	117.31	2.73	
Cr	Measured concentration of impurity in sample (µg/ml):	2.18E-02	< 5.79E-04	**Cr**	< 5.79E-04	
	Uncorrected weight of impurity in sample (µg):	1.02	< 0.03	< 1.05	< 0.01	N
	Weight of impurity in blank (µg):	< 0.03	< 0.03		< 0.01	
	Minimum corrected weight of impurity in sample (µg):	1.00	0.00	1.00	0.00	
	Maximum corrected weight of impurity in sample (µg):	1.02	0.03	1.05	0.01	
Mn	Measured concentration of impurity in sample (µg/ml):	8.36E-03	1.23E-03	**Mn**	< 9.36E-04	
	Uncorrected weight of impurity in sample (µg):	0.39	0.06	0.45	< 0.02	N
	Weight of impurity in blank (µg):	< 0.04	< 0.05		< 0.02	
	Minimum corrected weight of impurity in sample (µg):	0.35	0.01	0.36	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.39	0.06	0.45	0.02	
Co	Measured concentration of impurity in sample (µg/ml):	1.41E-03	< 1.69E-04	**Co**	< 1.69E-04	
	Uncorrected weight of impurity in sample (µg):	0.07	< 0.01	< 0.07	< 0.00	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.05	0.00	0.05	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.05	0.01	0.05	0.00	
Ni	Measured concentration of impurity in sample (µg/ml):	4.43E-02	< 1.54E-02	**Ni**	< 1.54E-02	
	Uncorrected weight of impurity in sample (µg):	2.08	< 0.77	< 2.85	< 0.39	N
	Weight of impurity in blank (µg):	< 0.74	< 0.79		< 0.28	
	Minimum corrected weight of impurity in sample (µg):	1.34	0.00	1.34	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.08	0.77	2.85	0.39	
Ca	Measured concentration of impurity in sample (µg/ml):	9.87E-01	2.30E-01	**Ca**	9.59E-02	
	Uncorrected weight of impurity in sample (µg):	46.39	11.50	60.29	2.40	Y
	Weight of impurity in blank (µg):	7.58	3.27		0.93	
	Minimum corrected weight of impurity in sample (µg):	38.81	8.23	48.50	1.47	
	Maximum corrected weight of impurity in sample (µg):	38.81	8.23	48.50	1.47	
Al	Measured concentration of impurity in sample (µg/ml):	1.51E+00	3.20E-01	**Al**	1.29E-01	
	Uncorrected weight of impurity in sample (µg):	70.97	16.00	93.42	6.45	Y
	Weight of impurity in blank (µg):	1.78	2.20		1.52	
	Minimum corrected weight of impurity in sample (µg):	69.19	13.80	87.93	4.93	
	Maximum corrected weight of impurity in sample (µg):	69.19	13.80	87.93	4.93	
Ti	Measured concentration of impurity in sample (µg/ml):	5.44E-01	7.20E-02	**Ti**	1.11E-02	
	Uncorrected weight of impurity in sample (µg):	25.57	3.60	29.17	0.28	N
	Weight of impurity in blank (µg):	< 0.18	< 0.19		< 0.07	
	Minimum corrected weight of impurity in sample (µg):	25.39	3.41	28.80	0.21	
	Maximum corrected weight of impurity in sample (µg):	25.57	3.60	29.17	0.28	
V	Measured concentration of impurity in sample (µg/ml):	2.73E-01	3.87E-03	**V**	< 8.43E-04	
	Uncorrected weight of impurity in sample (µg):	12.83	0.19	13.02	< 0.02	N
	Weight of impurity in blank (µg):	< 0.04	< 0.04		< 0.02	
	Minimum corrected weight of impurity in sample (µg):	12.79	0.15	12.94	0.00	
	Maximum corrected weight of impurity in sample (µg):	12.83	0.19	13.02	0.02	

Comments

FCM checked the data against the official results of RMAL17875 on 2/5/2018.

Fred C. Montgomery — Operator

2-6-2018 — Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1004, 1016, 1018, 1085, 1101
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17120502	B17120802		W17120802	
	Total volume of leach solution (ml):	41.0	48.0		19.0	
	Radiochemical laboratory analysis number:	17875-002	17875-007		17875-012	
	Measured uranium concentration (µg/ml):	3.02E-01	6.22E-03		3.11E-03	
	Uncertainty in uranium concentration (µg/ml):	3.02E-02	6.22E-04		3.11E-04	
	Weight uranium leached (g):	1.24E-05	2.99E-07	1.27E-05	5.91E-08	N
	Uncertainty in weight uranium leached (g):	1.25E-06	3.01E-08	1.25E-06	6.25E-09	
	Equivalent number of leached kernels:	3.14E-02	7.58E-04	3.22E-02	1.50E-04	
	Uncertainty in equivalent number of leached kernels:	3.20E-03	7.68E-05	3.20E-03	1.59E-05	
Fe	Measured concentration of impurity in sample (µg/ml):	2.74E+00	1.17E-01	Fe	< 1.09E-01	
	Uncorrected weight of impurity in sample (µg):	112.34	5.62	117.96	< 2.07	N
	Weight of impurity in blank (µg):	< 5.23	< 5.56		< 1.96	
	Minimum corrected weight of impurity in sample (µg):	107.11	0.06	107.17	0.00	
	Maximum corrected weight of impurity in sample (µg):	112.34	5.62	117.96	2.07	
Cr	Measured concentration of impurity in sample (µg/ml):	1.81E-02	< 5.79E-04	Cr	< 5.79E-04	
	Uncorrected weight of impurity in sample (µg):	0.74	< 0.03	< 0.77	< 0.01	N
	Weight of impurity in blank (µg):	< 0.03	< 0.03		< 0.01	
	Minimum corrected weight of impurity in sample (µg):	0.71	0.00	0.71	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.74	0.03	0.77	0.01	
Mn	Measured concentration of impurity in sample (µg/ml):	6.42E-03	< 9.36E-04	Mn	< 9.36E-04	
	Uncorrected weight of impurity in sample (µg):	0.26	< 0.04	< 0.31	< 0.02	N
	Weight of impurity in blank (µg):	< 0.04	< 0.05		< 0.02	
	Minimum corrected weight of impurity in sample (µg):	0.22	0.00	0.22	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.26	0.04	0.31	0.02	
Co	Measured concentration of impurity in sample (µg/ml):	1.74E-03	< 1.69E-04	Co	< 1.69E-04	
	Uncorrected weight of impurity in sample (µg):	0.07	< 0.01	< 0.08	< 0.00	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.05	0.00	0.05	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.05	0.01	0.06	0.00	
Ni	Measured concentration of impurity in sample (µg/ml):	4.46E-02	< 1.54E-02	Ni	< 1.54E-02	
	Uncorrected weight of impurity in sample (µg):	1.83	< 0.74	< 2.57	< 0.29	N
	Weight of impurity in blank (µg):	< 0.74	< 0.79		< 0.28	
	Minimum corrected weight of impurity in sample (µg):	1.09	0.00	1.09	0.00	
	Maximum corrected weight of impurity in sample (µg):	1.83	0.74	2.57	0.29	
Ca	Measured concentration of impurity in sample (µg/ml):	8.03E-01	7.10E-01	Ca	1.87E-01	
	Uncorrected weight of impurity in sample (µg):	32.92	34.08	70.56	3.55	Y
	Weight of impurity in blank (µg):	7.58	3.27		0.93	
	Minimum corrected weight of impurity in sample (µg):	25.34	30.81	58.77	2.62	
	Maximum corrected weight of impurity in sample (µg):	25.34	30.81	58.77	2.62	
Al	Measured concentration of impurity in sample (µg/ml):	1.09E+00	4.31E-01	Al	1.99E-01	
	Uncorrected weight of impurity in sample (µg):	44.69	20.69	69.16	3.78	Y
	Weight of impurity in blank (µg):	1.78	2.20		1.52	
	Minimum corrected weight of impurity in sample (µg):	42.91	18.48	63.66	2.27	
	Maximum corrected weight of impurity in sample (µg):	42.91	18.48	63.66	2.27	
Ti	Measured concentration of impurity in sample (µg/ml):	5.51E-01	8.46E-02	Ti	1.32E-02	
	Uncorrected weight of impurity in sample (µg):	22.59	4.06	26.65	0.25	N
	Weight of impurity in blank (µg):	< 0.18	< 0.19		< 0.07	
	Minimum corrected weight of impurity in sample (µg):	22.41	3.87	26.29	0.18	
	Maximum corrected weight of impurity in sample (µg):	22.59	4.06	26.65	0.25	
V	Measured concentration of impurity in sample (µg/ml):	2.65E-01	3.67E-03	V	< 8.43E-04	
	Uncorrected weight of impurity in sample (µg):	10.87	0.18	11.04	< 0.02	N
	Weight of impurity in blank (µg):	< 0.04	< 0.04		< 0.02	
	Minimum corrected weight of impurity in sample (µg):	10.82	0.13	10.96	0.00	
	Maximum corrected weight of impurity in sample (µg):	10.87	0.18	11.04	0.02	

Comments

FCM checked the data against the official results of RMAL17875 on 2/5/2018.

Fred C. Montgomery — Operator

2-6-2018 — Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1006, 1057, 1068, 1078, 1107
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17120503	B17120803		W17120803	
	Total volume of leach solution (ml):	45.0	46.0		20.0	
	Radiochemical laboratory analysis number:	17875-003	17875-008		17875-013	
	Measured uranium concentration (µg/ml):	9.28E+00	7.20E-02		3.16E-03	
	Uncertainty in uranium concentration (µg/ml):	9.28E-01	7.20E-03		3.16E-04	
	Weight uranium leached (g):	4.18E-04	3.31E-06	4.21E-04	6.32E-08	N
	Uncertainty in weight uranium leached (g):	4.22E-05	3.34E-07	4.22E-05	6.65E-09	
	Equivalent number of leached kernels:	1.06E+00	8.41E-03	1.07E+00	1.60E-04	
	Uncertainty in equivalent number of leached kernels:	1.08E-01	8.53E-04	1.08E-01	1.69E-05	
Fe	Measured concentration of impurity in sample (µg/ml):	3.32E+00	1.22E-01	**Fe**	< 1.09E-01	
	Uncorrected weight of impurity in sample (µg):	149.40	5.61	155.01	< 2.18	N
	Weight of impurity in blank (µg):	< 5.23	< 5.56		< 1.96	
	Minimum corrected weight of impurity in sample (µg):	144.17	0.05	144.22	0.00	
	Maximum corrected weight of impurity in sample (µg):	149.40	5.61	155.01	2.18	
Cr	Measured concentration of impurity in sample (µg/ml):	1.94E-02	< 5.79E-04	**Cr**	< 5.79E-04	
	Uncorrected weight of impurity in sample (µg):	0.87	< 0.03	< 0.90	< 0.01	N
	Weight of impurity in blank (µg):	< 0.03	< 0.03		< 0.01	
	Minimum corrected weight of impurity in sample (µg):	0.85	0.00	0.85	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.87	0.03	0.90	0.01	
Mn	Measured concentration of impurity in sample (µg/ml):	6.30E-03	< 9.36E-04	**Mn**	< 9.36E-04	
	Uncorrected weight of impurity in sample (µg):	0.28	< 0.04	< 0.33	< 0.02	N
	Weight of impurity in blank (µg):	< 0.04	< 0.05		< 0.02	
	Minimum corrected weight of impurity in sample (µg):	0.24	0.00	0.24	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.28	0.04	0.33	0.02	
Co	Measured concentration of impurity in sample (µg/ml):	2.12E-03	< 1.69E-04	**Co**	< 1.69E-04	
	Uncorrected weight of impurity in sample (µg):	0.10	< 0.01	< 0.10	< 0.00	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.07	0.00	0.07	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.07	0.01	0.08	0.00	
Ni	Measured concentration of impurity in sample (µg/ml):	5.94E-02	< 1.54E-02	**Ni**	< 1.54E-02	
	Uncorrected weight of impurity in sample (µg):	2.67	< 0.71	< 3.38	< 0.31	N
	Weight of impurity in blank (µg):	< 0.74	< 0.79		< 0.28	
	Minimum corrected weight of impurity in sample (µg):	1.93	0.00	1.93	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.67	0.71	3.38	0.31	
Ca	Measured concentration of impurity in sample (µg/ml):	1.01E+00	2.02E-01	**Ca**	1.25E-01	
	Uncorrected weight of impurity in sample (µg):	45.45	9.29	57.24	2.50	Y
	Weight of impurity in blank (µg):	7.58	3.27		0.93	
	Minimum corrected weight of impurity in sample (µg):	37.87	6.02	45.46	1.57	
	Maximum corrected weight of impurity in sample (µg):	37.87	6.02	45.46	1.57	
Al	Measured concentration of impurity in sample (µg/ml):	1.29E+00	2.27E-01	**Al**	1.89E-01	
	Uncorrected weight of impurity in sample (µg):	58.05	10.44	72.27	3.78	Y
	Weight of impurity in blank (µg):	1.78	2.20		1.52	
	Minimum corrected weight of impurity in sample (µg):	56.27	8.24	66.78	2.26	
	Maximum corrected weight of impurity in sample (µg):	56.27	8.24	66.78	2.26	
Ti	Measured concentration of impurity in sample (µg/ml):	4.29E-01	6.22E-02	**Ti**	9.67E-03	
	Uncorrected weight of impurity in sample (µg):	19.31	2.86	22.17	0.19	N
	Weight of impurity in blank (µg):	< 0.18	< 0.19		< 0.07	
	Minimum corrected weight of impurity in sample (µg):	19.13	2.67	21.80	0.13	
	Maximum corrected weight of impurity in sample (µg):	19.31	2.86	22.17	0.19	
V	Measured concentration of impurity in sample (µg/ml):	2.51E-01	5.55E-03	**V**	< 8.43E-04	
	Uncorrected weight of impurity in sample (µg):	11.30	0.26	11.55	< 0.02	N
	Weight of impurity in blank (µg):	< 0.04	< 0.04		< 0.02	
	Minimum corrected weight of impurity in sample (µg):	11.25	0.21	11.47	0.00	
	Maximum corrected weight of impurity in sample (µg):	11.30	0.26	11.55	0.02	

Comments

FCM checked the data against the official results of RMAL17875 on 2/5/2018.

Fred C. Montgomery
Operator

2-6-2018
Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	1002, 1036, 1038, 1083, 1098
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Number of compacts:	5
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17120504	B17120804		W17120804	
	Total volume of leach solution (ml):	45.0	48.0		20.0	
	Radiochemical laboratory analysis number:	17875-004	17875-009		17875-014	
	Measured uranium concentration (µg/ml):	3.04E-01	5.43E-03		4.00E-03	
	Uncertainty in uranium concentration (µg/ml):	3.04E-02	5.43E-04		4.00E-04	
	Weight uranium leached (g):	1.37E-05	2.61E-07	1.39E-05	8.00E-08	N
	Uncertainty in weight uranium leached (g):	1.38E-06	2.63E-08	1.38E-06	8.41E-09	
	Equivalent number of leached kernels:	3.47E-02	6.62E-04	3.54E-02	2.03E-04	
	Uncertainty in equivalent number of leached kernels:	3.53E-03	6.71E-05	3.53E-03	2.14E-05	
Fe	Measured concentration of impurity in sample (µg/ml):	2.43E+00	< 1.09E-01	**Fe**	< 1.09E-01	
	Uncorrected weight of impurity in sample (µg):	109.35	< 5.23	<114.58	< 2.18	N
	Weight of impurity in blank (µg):	< 5.23	< 5.56		< 1.96	
	Minimum corrected weight of impurity in sample (µg):	104.12	0.00	104.12	0.00	
	Maximum corrected weight of impurity in sample (µg):	109.35	5.23	114.58	2.18	
Cr	Measured concentration of impurity in sample (µg/ml):	1.79E-02	< 5.79E-04	**Cr**	< 5.79E-04	
	Uncorrected weight of impurity in sample (µg):	0.81	< 0.03	< 0.83	< 0.01	N
	Weight of impurity in blank (µg):	< 0.03	< 0.03		< 0.01	
	Minimum corrected weight of impurity in sample (µg):	0.78	0.00	0.78	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.81	0.03	0.83	0.01	
Mn	Measured concentration of impurity in sample (µg/ml):	7.19E-03	< 9.36E-04	**Mn**	< 9.36E-04	
	Uncorrected weight of impurity in sample (µg):	0.32	< 0.04	< 0.37	< 0.02	N
	Weight of impurity in blank (µg):	< 0.04	< 0.05		< 0.02	
	Minimum corrected weight of impurity in sample (µg):	0.28	0.00	0.28	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.32	0.04	0.37	0.02	
Co	Measured concentration of impurity in sample (µg/ml):	1.41E-03	< 1.69E-04	**Co**	< 1.69E-04	
	Uncorrected weight of impurity in sample (µg):	0.06	< 0.01	< 0.07	< 0.00	N
	Weight of impurity in blank (µg):	0.02	< 0.01		< 0.00	
	Minimum corrected weight of impurity in sample (µg):	0.04	0.00	0.04	0.00	
	Maximum corrected weight of impurity in sample (µg):	0.04	0.01	0.05	0.00	
Ni	Measured concentration of impurity in sample (µg/ml):	4.46E-02	< 1.54E-02	**Ni**	< 1.54E-02	
	Uncorrected weight of impurity in sample (µg):	2.01	< 0.74	< 2.75	< 0.31	N
	Weight of impurity in blank (µg):	< 0.74	< 0.79		< 0.28	
	Minimum corrected weight of impurity in sample (µg):	1.27	0.00	1.27	0.00	
	Maximum corrected weight of impurity in sample (µg):	2.01	0.74	2.75	0.31	
Ca	Measured concentration of impurity in sample (µg/ml):	1.06E+00	1.89E-01	**Ca**	2.78E-01	
	Uncorrected weight of impurity in sample (µg):	47.70	9.07	62.33	5.56	Y
	Weight of impurity in blank (µg):	7.58	3.27		0.93	
	Minimum corrected weight of impurity in sample (µg):	40.12	5.80	50.55	4.63	
	Maximum corrected weight of impurity in sample (µg):	40.12	5.80	50.55	4.63	
Al	Measured concentration of impurity in sample (µg/ml):	1.47E+00	2.65E-01	**Al**	3.84E-01	
	Uncorrected weight of impurity in sample (µg):	66.15	12.72	86.55	7.68	Y
	Weight of impurity in blank (µg):	1.78	2.20		1.52	
	Minimum corrected weight of impurity in sample (µg):	64.37	10.52	81.06	6.16	
	Maximum corrected weight of impurity in sample (µg):	64.37	10.52	81.06	6.16	
Ti	Measured concentration of impurity in sample (µg/ml):	4.21E-01	3.82E-02	**Ti**	1.61E-02	
	Uncorrected weight of impurity in sample (µg):	18.95	1.83	21.10	0.32	Y
	Weight of impurity in blank (µg):	< 0.18	< 0.19		< 0.07	
	Minimum corrected weight of impurity in sample (µg):	18.77	1.65	20.67	0.26	
	Maximum corrected weight of impurity in sample (µg):	18.95	1.83	21.10	0.32	
V	Measured concentration of impurity in sample (µg/ml):	2.47E-01	5.61E-03	**V**	< 8.43E-04	
	Uncorrected weight of impurity in sample (µg):	11.12	0.27	11.38	< 0.02	N
	Weight of impurity in blank (µg):	< 0.04	< 0.04		< 0.02	
	Minimum corrected weight of impurity in sample (µg):	11.07	0.23	11.30	0.00	
	Maximum corrected weight of impurity in sample (µg):	11.12	0.27	11.38	0.02	

Comments

FCM checked the data against the official results of RMAL17875 on 2/5/2018.

Fred C. Montgomery — Operator

2-6-2018 — Date

Data Report Form DRF-26B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-26 Rev. 3
Operator:	Montgomery/Dyer
Compact lot ID:	BWXT J52R-16-14154C
Compact lot description:	AGR-5/6/7 compacts, 40% packing fraction
Compact ID numbers:	Post-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\14154C-Group 2_DRF26R3.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17120505	B17120805		W17120805	
	Total volume of leach solution (ml):	48.0	51.0		18.0	
	Radiochemical laboratory analysis number:	17875-005	17875-010		17875-015	
	Measured uranium concentration (µg/ml):	1.04E-03	3.28E-04		5.26E-04	
	Uncertainty in uranium concentration (µg/ml):	1.04E-04	3.28E-05		5.26E-05	
	Weight uranium leached (g):	4.99E-08	1.67E-08	6.66E-08	9.47E-09	N
	Uncertainty in weight uranium leached (g):	5.04E-09	1.69E-09	5.31E-09	1.01E-09	
	Equivalent number of leached kernels:	1.27E-04	4.25E-05	1.69E-04	2.40E-05	
	Uncertainty in equivalent number of leached kernels:	1.28E-05	4.30E-06	1.36E-05	2.57E-06	
Fe	Measured concentration (µg/ml):	< 1.09E-01	< 1.09E-01	**Fe**	< 1.09E-01	
	Total weight of leached impurity (µg):	< 5.23	< 5.56	<10.79	< 1.96	N
Cr	Measured concentration (µg/ml):	< 5.79E-04	< 5.79E-04	**Cr**	< 5.79E-04	
	Total weight of leached impurity (µg):	< 0.03	< 0.03	< 0.06	< 0.01	N
Mn	Measured concentration (µg/ml):	< 9.36E-04	< 9.36E-04	**Mn**	< 9.36E-04	
	Total weight of leached impurity (µg):	< 0.04	< 0.05	< 0.09	< 0.02	N
Co	Measured concentration (µg/ml):	4.35E-04	< 1.69E-04	**Co**	< 1.69E-04	
	Total weight of leached impurity (µg):	0.02	< 0.01	< 0.03	< 0.00	N
Ni	Measured concentration (µg/ml):	< 1.54E-02	< 1.54E-02	**Ni**	< 1.54E-02	
	Total weight of leached impurity (µg):	< 0.74	< 0.79	< 1.52	< 0.28	N
Ca	Measured concentration (µg/ml):	1.58E-01	6.41E-02	**Ca**	5.18E-02	
	Total weight of leached impurity (µg):	7.58	3.27	11.79	0.93	Y
Al	Measured concentration (µg/ml):	3.70E-02	4.32E-02	**Al**	8.42E-02	
	Total weight of leached impurity (µg):	1.78	2.20	5.49	1.52	Y
Ti	Measured concentration (µg/ml):	< 3.69E-03	< 3.69E-03	**Ti**	< 3.69E-03	
	Total weight of leached impurity (µg):	< 0.18	< 0.19	< 0.37	< 0.07	N
V	Measured concentration (µg/ml):	< 8.43E-04	< 8.43E-04	**V**	< 8.43E-04	
	Total weight of leached impurity (µg):	< 0.04	< 0.04	< 0.08	< 0.02	N

Comments

FCM checked the data against the official results of RMAL17875 on 2/5/2018.

Fred C. Montgomery
Operator

2-6-2018
Date

APPENDIX C. Report Forms for Over-coated Particles

Inspection Report Form IRF-C: Summary of Pre-burn Leach Uranium

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction

Particle clutch ID:	11034-01	11034-02	11034-03	11034-04	Total
Number of particles:	17627	18614	17972	17826	72039
Equivalent number of leached kernels:	9.0E-02	9.6E-02	9.2E-02	9.7E-02	3.7E-01

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-C: Summary of Pre-burn Leach Uranium

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction

Particle clutch ID:	11034-05	11034-06	11034-07	11034-08	Total
Number of particles:	19852	18722	17693	18964	75231
Equivalent number of leached kernels:	3.1E+00	1.7E-01	1.1E-01	3.6E+00	7.0E+00

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-D: Summary of Post-Burn Leach Uranium

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction

Particle clutch ID:	11034-01	11034-02	11034-03	11034-04	Total
Number of particles:	17627	18614	17972	17826	72039
Equivalent number of leached kernels:	3.7E-03	2.9E-03	3.6E-03	1.2E+00	1.2E+00

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Inspection Report Form IRF-D: Summary of Post-Burn Leach Uranium

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction

Particle clutch ID:	11034-05	11034-06	11034-07	11034-08	Total
Number of particles:	19852	18722	17693	18964	75231
Equivalent number of leached kernels:	1.5E-01	1.1E-01	6.4E-03	1.4E-02	2.8E-01

Comments

Data has been verified.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-01
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	36.0677
Approximate number of particles in clutch:	17627
Uncertainty in number of particles:	109
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17091901	L17092101		W17092106	
Total volume of leach solution (ml):		94.0	103.5		40.0	
Radiochemical laboratory analysis number:		17665-001	17665-006		17665-011	
Measured uranium concentration (µg/ml):		3.32E-01	3.99E-02		6.26E-03	
Uncertainty in uranium concentration (µg/ml):		3.32E-02	3.99E-03		6.26E-04	
Weight uranium leached (g):		3.12E-05	4.13E-06	3.53E-05	2.50E-07	N
Uncertainty in weight uranium leached (g):		3.13E-06	4.14E-07	3.16E-06	2.54E-08	
Equivalent number of leached kernels:		7.92E-02	1.05E-02	8.97E-02	6.36E-04	
Uncertainty in equivalent number of leached kernels:		7.98E-03	1.06E-03	8.06E-03	6.47E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17665 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-02
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight per particle, mean value (g):	2.05E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	38.0877
Approximate number of particles in clutch:	18614
Uncertainty in number of particles:	115
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17091902	L17092102		W17092107	
Total volume of leach solution (ml):		83.0	105.0		40.0	
Radiochemical laboratory analysis number:		17665-002	17665-007		17665-012	
Measured uranium concentration (µg/ml):		3.81E-01	6.05E-02		9.13E-03	
Uncertainty in uranium concentration (µg/ml):		3.81E-02	6.05E-03		9.13E-04	
Weight uranium leached (g):		3.16E-05	6.35E-06	3.80E-05	3.65E-07	N
Uncertainty in weight uranium leached (g):		3.17E-06	6.36E-07	3.24E-06	3.70E-08	
Equivalent number of leached kernels:		8.03E-02	1.61E-02	9.64E-02	9.27E-04	
Uncertainty in equivalent number of leached kernels:		8.09E-03	1.62E-03	8.27E-03	9.44E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17665 on 2/5/2018.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-03
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight per particle, mean value (g):	2.05E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	36.7740
Approximate number of particles in clutch:	17972
Uncertainty in number of particles:	111
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17091903	L17092103		W17092108	
Total volume of leach solution (ml):		92.0	87.5		40.0	
Radiochemical laboratory analysis number:		17665-003	17665-008		17665-013	
Measured uranium concentration (µg/ml):		3.45E-01	4.96E-02		7.14E-03	
Uncertainty in uranium concentration (µg/ml):		3.45E-02	4.96E-03		7.14E-04	
Weight uranium leached (g):		3.17E-05	4.34E-06	3.61E-05	2.86E-07	N
Uncertainty in weight uranium leached (g):		3.18E-06	4.35E-07	3.21E-06	2.89E-08	
Equivalent number of leached kernels:		8.06E-02	1.10E-02	9.16E-02	7.25E-04	
Uncertainty in equivalent number of leached kernels:		8.12E-03	1.11E-03	8.20E-03	7.38E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17665 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-04
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight per particle, mean value (g):	2.05E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	36.4763
Approximate number of particles in clutch:	17826
Uncertainty in number of particles:	110
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17091904	L17092104		W17092109	
	Total volume of leach solution (ml):	91.0	100.0		40.0	
	Radiochemical laboratory analysis number:	17665-004	17665-009		17665-014	
	Measured uranium concentration (µg/ml):	3.41E-01	7.29E-02		9.63E-03	
	Uncertainty in uranium concentration (µg/ml):	3.41E-02	7.29E-03		9.64E-04	
	Weight uranium leached (g):	3.10E-05	7.29E-06	3.83E-05	3.85E-07	N
	Uncertainty in weight uranium leached (g):	3.11E-06	7.31E-07	3.20E-06	3.91E-08	
	Equivalent number of leached kernels:	7.88E-02	1.85E-02	9.73E-02	9.78E-04	
	Uncertainty in equivalent number of leached kernels:	7.94E-03	1.86E-03	8.17E-03	9.96E-05	
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17665 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	Pre-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17091905	L17092105		W17092110	
	Total volume of leach solution (ml):	97.3	97.0		40.0	
	Radiochemical laboratory analysis number:	17665-005	17665-010		17665-015	
	Measured uranium concentration (µg/ml):	2.02E-04	2.68E-04		1.03E-04	
	Uncertainty in uranium concentration (µg/ml):	2.02E-05	2.68E-05		1.03E-05	
	Weight uranium leached (g):	1.97E-08	2.60E-08	4.57E-08	4.12E-09	N
	Uncertainty in weight uranium leached (g):	1.97E-09	2.61E-09	3.27E-09	4.17E-10	
	Equivalent number of leached kernels:	4.99E-05	6.60E-05	1.16E-04	1.05E-05	
	Uncertainty in equivalent number of leached kernels:	5.02E-06	6.65E-06	8.37E-06	1.06E-06	
Fe	Measured concentration (µg/ml):			Fe		
	Total weight of leached impurity (µg):					
Cr	Measured concentration (µg/ml):			Cr		
	Total weight of leached impurity (µg):					
Mn	Measured concentration (µg/ml):			Mn		
	Total weight of leached impurity (µg):					
Co	Measured concentration (µg/ml):			Co		
	Total weight of leached impurity (µg):					
Ni	Measured concentration (µg/ml):			Ni		
	Total weight of leached impurity (µg):					
Ca	Measured concentration (µg/ml):			Ca		
	Total weight of leached impurity (µg):					
Al	Measured concentration (µg/ml):			Al		
	Total weight of leached impurity (µg):					
Ti	Measured concentration (µg/ml):			Ti		
	Total weight of leached impurity (µg):					
V	Measured concentration (µg/ml):			V		
	Total weight of leached impurity (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17665 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-01
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	36.0677
Approximate number of particles in clutch:	17627
Uncertainty in number of particles:	109
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17101701	B17101706			
Total volume of leach solution (ml):		103.0	92.0			
Radiochemical laboratory analysis number:		17763-021	17763-026			
Measured uranium concentration (µg/ml):		9.11E-03	5.76E-03			
Uncertainty in uranium concentration (µg/ml):		9.11E-04	5.76E-04			
Weight uranium leached (g):		9.38E-07	5.30E-07	1.47E-06		
Uncertainty in weight uranium leached (g):		9.40E-08	5.31E-08	1.08E-07		
Equivalent number of leached kernels:		2.38E-03	1.34E-03	3.73E-03		
Uncertainty in equivalent number of leached kernels:		2.40E-04	1.36E-04	2.77E-04		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17763 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-02
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	36.0677
Approximate number of particles in clutch:	17627
Uncertainty in number of particles:	109
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17101702	B17101707			
Total volume of leach solution (ml):		104.0	91.0			
Radiochemical laboratory analysis number:		17763-022	17763-027			
Measured uranium concentration (µg/ml):		9.79E-03	1.54E-03			
Uncertainty in uranium concentration (µg/ml):		9.79E-04	1.54E-04			
Weight uranium leached (g):		1.02E-06	1.40E-07	1.16E-06		
Uncertainty in weight uranium leached (g):		1.02E-07	1.40E-08	1.03E-07		
Equivalent number of leached kernels:		2.58E-03	3.56E-04	2.94E-03		
Uncertainty in equivalent number of leached kernels:		2.60E-04	3.58E-05	2.63E-04		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17763 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-03
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	36.0677
Approximate number of particles in clutch:	17627
Uncertainty in number of particles:	109
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17101703	B17101708			
Total volume of leach solution (ml):		104.0	106.0			
Radiochemical laboratory analysis number:		17763-023	17763-028			
Measured uranium concentration (µg/ml):		1.14E-02	2.05E-03			
Uncertainty in uranium concentration (µg/ml):		1.14E-03	2.05E-04			
Weight uranium leached (g):		1.19E-06	2.17E-07	1.40E-06		
Uncertainty in weight uranium leached (g):		1.19E-07	2.18E-08	1.21E-07		
Equivalent number of leached kernels:		3.01E-03	5.52E-04	3.56E-03		
Uncertainty in equivalent number of leached kernels:		3.03E-04	5.55E-05	3.09E-04		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17763 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-04
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	36.0677
Approximate number of particles in clutch:	17627
Uncertainty in number of particles:	109
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17101704	B17101709			
Total volume of leach solution (ml):		104.0	99.0			
Radiochemical laboratory analysis number:		17763-024	17763-029			
Measured uranium concentration (µg/ml):		4.66E+00	1.38E-02			
Uncertainty in uranium concentration (µg/ml):		4.66E-01	1.38E-03			
Weight uranium leached (g):		4.85E-04	1.37E-06	4.86E-04		
Uncertainty in weight uranium leached (g):		4.86E-05	1.37E-07	4.86E-05		
Equivalent number of leached kernels:		1.23E+00	3.47E-03	1.23E+00		
Uncertainty in equivalent number of leached kernels:		1.24E-01	3.49E-04	1.24E-01		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses for RMAL17763 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	Post-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 1_DRF21R2.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total
	Post-burn leach solution ID:	B17101705	B17101710	
	Total volume of leach solution (ml):	70.0	98.0	
	Radiochemical laboratory analysis number:	17763-025	17763-030	
	Measured uranium concentration (µg/ml):	2.22E-04	2.54E-04	
	Uncertainty in uranium concentration (µg/ml):	2.22E-05	2.54E-05	
	Weight uranium leached (g):	1.55E-08	2.49E-08	4.04E-08
	Uncertainty in weight uranium leached (g):	1.56E-09	2.49E-09	2.94E-09
	Equivalent number of leached kernels:	3.94E-05	6.32E-05	1.03E-04
	Uncertainty in equivalent number of leached kernels:	3.98E-06	6.36E-06	7.54E-06
Fe	Measured concentration (µg/ml):			Fe
	Total weight of leached impurity (µg):			
Cr	Measured concentration (µg/ml):			Cr
	Total weight of leached impurity (µg):			
Mn	Measured concentration (µg/ml):			Mn
	Total weight of leached impurity (µg):			
Co	Measured concentration (µg/ml):			Co
	Total weight of leached impurity (µg):			
Ni	Measured concentration (µg/ml):			Ni
	Total weight of leached impurity (µg):			
Ca	Measured concentration (µg/ml):			Ca
	Total weight of leached impurity (µg):			
Al	Measured concentration (µg/ml):			Al
	Total weight of leached impurity (µg):			
Ti	Measured concentration (µg/ml):			Ti
	Total weight of leached impurity (µg):			
V	Measured concentration (µg/ml):			V
	Total weight of leached impurity (µg):			

Water rinse	Include if > 10% of 2nd leach

Comments

FCM checked the data against the Official Results of Analyses for RMAL17763 on 2/5/2018.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-05
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	40.6215
Approximate number of particles in clutch:	19852
Uncertainty in number of particles:	123
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17100901	L17101001			
Total volume of leach solution (ml):		93.0	111.0			
Radiochemical laboratory analysis number:		17763-001	17763-006			
Measured uranium concentration (µg/ml):		1.12E+01	1.59E+00			
Uncertainty in uranium concentration (µg/ml):		1.12E+00	1.59E-01			
Weight uranium leached (g):		1.04E-03	1.76E-04	1.22E-03		
Uncertainty in weight uranium leached (g):		1.04E-04	1.77E-05	1.06E-04		
Equivalent number of leached kernels:		2.64E+00	4.48E-01	3.09E+00		
Uncertainty in equivalent number of leached kernels:		2.66E-01	4.51E-02	2.71E-01		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-06
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight per particle, mean value (g):	2.05E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	38.3092
Approximate number of particles in clutch:	18722
Uncertainty in number of particles:	116
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17100902	L17101002			
Total volume of leach solution (ml):		83.0	107.0			
Radiochemical laboratory analysis number:		17763-002	17763-007			
Measured uranium concentration (µg/ml):		3.76E-01	3.50E-01			
Uncertainty in uranium concentration (µg/ml):		3.76E-02	3.50E-02			
Weight uranium leached (g):		3.12E-05	3.75E-05	6.87E-05		
Uncertainty in weight uranium leached (g):		3.13E-06	3.75E-06	4.89E-06		
Equivalent number of leached kernels:		7.92E-02	9.51E-02	1.74E-01		
Uncertainty in equivalent number of leached kernels:		7.98E-03	9.57E-03	1.25E-02		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-07
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight per particle, mean value (g):	2.05E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	36.2038
Approximate number of particles in clutch:	17693
Uncertainty in number of particles:	110
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17100903	L17101003			
	Total volume of leach solution (ml):	90.0	114.0			
	Radiochemical laboratory analysis number:	17763-003	17763-008			
	Measured uranium concentration (µg/ml):	4.03E-01	6.71E-02			
	Uncertainty in uranium concentration (µg/ml):	4.03E-02	6.71E-03			
	Weight uranium leached (g):	3.63E-05	7.65E-06	4.39E-05		
	Uncertainty in weight uranium leached (g):	3.64E-06	7.66E-07	3.72E-06		
	Equivalent number of leached kernels:	9.21E-02	1.94E-02	1.11E-01		
	Uncertainty in equivalent number of leached kernels:	9.28E-03	1.95E-03	9.50E-03		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-08
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight per particle, mean value (g):	2.05E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	38.8042
Approximate number of particles in clutch:	18964
Uncertainty in number of particles:	117
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Pre-burn leach solution ID:		L17100904	L17101004			
Total volume of leach solution (ml):		92.0	109.0			
Radiochemical laboratory analysis number:		17763-004	17763-009			
Measured uranium concentration (µg/ml):		1.51E+01	2.16E-01			
Uncertainty in uranium concentration (µg/ml):		1.51E-01	2.16E-02			
Weight uranium leached (g):		1.39E-03	2.35E-05	1.41E-03		
Uncertainty in weight uranium leached (g):		1.70E-05	2.36E-06	1.72E-05		
Equivalent number of leached kernels:		3.53E+00	5.98E-02	3.59E+00		
Uncertainty in equivalent number of leached kernels:		5.57E-02	6.02E-03	5.64E-02		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21A: Pre-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	Pre-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Pre-burn leach solution ID:	L17100905	L17101005			
	Total volume of leach solution (ml):	75.0	70.0			
	Radiochemical laboratory analysis number:	17763-005	17763-010			
	Measured uranium concentration (µg/ml):	2.65E-04	1.39E-03			
	Uncertainty in uranium concentration (µg/ml):	2.65E-05	1.39E-04			
	Weight uranium leached (g):	1.99E-08	9.73E-08	1.17E-07		
	Uncertainty in weight uranium leached (g):	1.99E-09	9.77E-09	9.97E-09		
	Equivalent number of leached kernels:	5.04E-05	2.47E-04	2.97E-04		
	Uncertainty in equivalent number of leached kernels:	5.09E-06	2.49E-05	2.55E-05		
Fe	Measured concentration (µg/ml):			Fe		
	Total weight of leached impurity (µg):					
Cr	Measured concentration (µg/ml):			Cr		
	Total weight of leached impurity (µg):					
Mn	Measured concentration (µg/ml):			Mn		
	Total weight of leached impurity (µg):					
Co	Measured concentration (µg/ml):			Co		
	Total weight of leached impurity (µg):					
Ni	Measured concentration (µg/ml):			Ni		
	Total weight of leached impurity (µg):					
Ca	Measured concentration (µg/ml):			Ca		
	Total weight of leached impurity (µg):					
Al	Measured concentration (µg/ml):			Al		
	Total weight of leached impurity (µg):					
Ti	Measured concentration (µg/ml):			Ti		
	Total weight of leached impurity (µg):					
V	Measured concentration (µg/ml):			V		
	Total weight of leached impurity (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery — Operator

2-8-2018 — Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-05
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	40.6215
Approximate number of particles in clutch:	19852
Uncertainty in number of particles:	123
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17101901	B17102001			
Total volume of leach solution (ml):		60.0	67.0			
Radiochemical laboratory analysis number:		17763-011	17763-016			
Measured uranium concentration (µg/ml):		9.62E-01	1.23E-02			
Uncertainty in uranium concentration (µg/ml):		9.62E-02	1.23E-03			
Weight uranium leached (g):		5.77E-05	8.24E-07	5.85E-05		
Uncertainty in weight uranium leached (g):		5.81E-06	8.28E-08	5.81E-06		
Equivalent number of leached kernels:		1.46E-01	2.09E-03	1.49E-01		
Uncertainty in equivalent number of leached kernels:		1.48E-02	2.11E-04	1.48E-02		
Fe	Measured concentration of impurity in sample (µg/ml):			**Fe**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			**Cr**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			**Mn**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			**Co**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			**Ni**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			**Ca**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			**Al**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			**Ti**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			**V**		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-06
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	40.6215
Approximate number of particles in clutch:	19852
Uncertainty in number of particles:	123
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17101902	B17102002			
Total volume of leach solution (ml):		58.0	66.0			
Radiochemical laboratory analysis number:		17763-012	17763-017			
Measured uranium concentration (µg/ml):		4.49E-02	5.96E-01			
Uncertainty in uranium concentration (µg/ml):		4.49E-03	5.96E-02			
Weight uranium leached (g):		2.60E-06	3.93E-05	4.19E-05		
Uncertainty in weight uranium leached (g):		2.62E-07	3.95E-06	3.96E-06		
Equivalent number of leached kernels:		6.61E-03	9.98E-02	1.06E-01		
Uncertainty in equivalent number of leached kernels:		6.68E-04	1.01E-02	1.01E-02		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-07
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	40.6215
Approximate number of particles in clutch:	19852
Uncertainty in number of particles:	123
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17101903	B17102003			
Total volume of leach solution (ml):		56.0	69.0			
Radiochemical laboratory analysis number:		17763-013	17763-018			
Measured uranium concentration (µg/ml):		4.31E-02	1.58E-03			
Uncertainty in uranium concentration (µg/ml):		4.31E-03	1.58E-04			
Weight uranium leached (g):		2.41E-06	1.09E-07	2.52E-06		
Uncertainty in weight uranium leached (g):		2.43E-07	1.10E-08	2.43E-07		
Equivalent number of leached kernels:		6.13E-03	2.77E-04	6.40E-03		
Uncertainty in equivalent number of leached kernels:		6.20E-04	2.79E-05	6.21E-04		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	11034-08
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight per particle, mean value (g):	2.046E-03
Average weight per particle, uncertainty in mean (g):	1.27E-05
Weight of particle clutch (g):	40.6215
Approximate number of particles in clutch:	19852
Uncertainty in number of particles:	123
Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
Post-burn leach solution ID:		B17101904	B17102004			
Total volume of leach solution (ml):		55.0	73.0			
Radiochemical laboratory analysis number:		17763-014	17763-019			
Measured uranium concentration (µg/ml):		9.90E-02	2.23E-03			
Uncertainty in uranium concentration (µg/ml):		9.90E-03	2.23E-04			
Weight uranium leached (g):		5.45E-06	1.63E-07	5.61E-06		
Uncertainty in weight uranium leached (g):		5.48E-07	1.63E-08	5.49E-07		
Equivalent number of leached kernels:		1.38E-02	4.13E-04	1.42E-02		
Uncertainty in equivalent number of leached kernels:		1.40E-03	4.17E-05	1.40E-03		
Fe	Measured concentration of impurity in sample (µg/ml):			Fe		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Cr	Measured concentration of impurity in sample (µg/ml):			Cr		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Mn	Measured concentration of impurity in sample (µg/ml):			Mn		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Co	Measured concentration of impurity in sample (µg/ml):			Co		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ni	Measured concentration of impurity in sample (µg/ml):			Ni		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ca	Measured concentration of impurity in sample (µg/ml):			Ca		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Al	Measured concentration of impurity in sample (µg/ml):			Al		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
Ti	Measured concentration of impurity in sample (µg/ml):			Ti		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					
V	Measured concentration of impurity in sample (µg/ml):			V		
	Uncorrected weight of impurity in sample (µg):					
	Weight of impurity in blank (µg):					
	Minimum corrected weight of impurity in sample (µg):					
	Maximum corrected weight of impurity in sample (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date

Data Report Form DRF-21B: Post-Burn Leach Uranium and Impurities

Procedure:	AGR-CHAR-DAM-21 Rev. 2
Operator:	Montgomery/Dyer/Helmreich
Particle lot ID:	BWXT J52R-16-11034
Particle lot description:	AGR-5/6/7 over-coated particles, 40% packing fraction
Particle clutch ID:	Post-burn leach blank
DRF filename:	\\mc-agr\AGR\LeachBurnLeach\11034-Group 2_DRF21R2.xls

Average weight uranium per particle, mean value (g):	3.94E-04
Average weight uranium per particle, uncertainty in mean (g):	3.94E-06

		First Leach	Second Leach	Total	Water rinse	Include if > 10% of 2nd leach
	Post-burn leach solution ID:	B17101905	B17102005			
	Total volume of leach solution (ml):	39.0	49.0			
	Radiochemical laboratory analysis number:	17763-015	17763-020			
	Measured uranium concentration (µg/ml):	1.10E-04	6.94E-04			
	Uncertainty in uranium concentration (µg/ml):	1.10E-05	6.94E-05			
	Weight uranium leached (g):	4.29E-09	3.40E-08	3.83E-08		
	Uncertainty in weight uranium leached (g):	4.35E-10	3.43E-09	3.46E-09		
	Equivalent number of leached kernels:	1.09E-05	8.63E-05	9.72E-05		
	Uncertainty in equivalent number of leached kernels:	1.11E-06	8.75E-06	8.83E-06		
Fe	Measured concentration (µg/ml):			Fe		
	Total weight of leached impurity (µg):					
Cr	Measured concentration (µg/ml):			Cr		
	Total weight of leached impurity (µg):					
Mn	Measured concentration (µg/ml):			Mn		
	Total weight of leached impurity (µg):					
Co	Measured concentration (µg/ml):			Co		
	Total weight of leached impurity (µg):					
Ni	Measured concentration (µg/ml):			Ni		
	Total weight of leached impurity (µg):					
Ca	Measured concentration (µg/ml):			Ca		
	Total weight of leached impurity (µg):					
Al	Measured concentration (µg/ml):			Al		
	Total weight of leached impurity (µg):					
Ti	Measured concentration (µg/ml):			Ti		
	Total weight of leached impurity (µg):					
V	Measured concentration (µg/ml):			V		
	Total weight of leached impurity (µg):					

Comments

FCM checked the data against the Official Results of Analyses report for RMAL17763 on 2/5/2017.

Fred C. Montgomery
Operator

2-8-2018
Date