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EM-LA

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Date: APR 2 3 2018
Symbol: EPC-DO: 18-174
LA-UR: 18-23302
Locates Action No.: *N/A*

Mr. John E. Kieling, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

Subject: **Transmittal of Analytical Results of the Eighth Pre-treatment Sample for the Los Alamos National Laboratory Hazardous Waste Facility Permit**

Dear Mr. Kieling:

The purpose of this letter is to report analytical results as required by the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit issued to the Department of Energy (DOE) and Los Alamos National Security, LLC (LANS), collectively the Permittees, in November 2010. Permit Section 7.6(2) and Section C.3.2.4 of Permit Attachment C (*Waste Analysis Plan*) require the collection of pre-treatment solid waste samples from six remediated nitrate salt-bearing waste containers and pre-treatment liquid waste samples from two unremediated nitrate salt-bearing waste containers. Analytical results from LANL on-site laboratory testing must be provided to the New Mexico Environment Department Hazardous Waste Bureau (NMED-HWB) within 60 days of the sample collection. The final pre-treatment sample from container S844602 (repackaged to container 72672) was collected on February 20, 2018.

Enclosure 1 includes a memorandum detailing the analytical results from the on-site analytical laboratory to the waste generating organization. Enclosure 2 includes a table with a column indicating expected ranges for each analyte based on the Permittee's surrogate waste testing for remediated nitrate salt-bearing waste. The expected ranges for the waste stream were developed by the Permittees from the ranges of the surrogate materials utilized while developing the treatment method for nitrate salt waste. Most constituents and properties of this sample were comparable to the expected ranges for the waste stream.

Potassium, Arsenic, Barium, Selenium, Beryllium, chloride, fluoride, oxalate, and water within the sample were all reported greater than expected concentrations. None of these concentrations affect the hazardous waste characterization information for the unremediated nitrate salt waste stream. Additionally, the concentration variances should not have any bearing on the effectiveness of the stabilization treatment process.

If you have comments or questions regarding this submittal, please contact Arturo Duran (Environmental Management) at (505) 665-7772 or Mark P. Haagenstad (LANS) at (505) 665-2014.

Sincerely,

Benjamine B. Roberts
Division Leader

Sincerely,

Arturo Q. Duran
Permitting and Compliance Manager

BBR/AQD/MPH:kr

Enclosures:

1) Analytical Results for Sample Collected from Unremediated Nitrate Salt-Bearing Waste Container 72672
2) Comparison Table of Expected Chemical Constituents/Properties

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Document: Analytical Results for 72672
Date: April 2018

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

4/19/2018

Benjamine B. Roberts
Division Leader
Environmental Protection and Compliance Programs
Los Alamos National Laboratory

Date Signed

for

4-20-2018

Arturo Q. Duran
Permitting Manager
Environmental Management
Los Alamos Field Office
U.S. Department of Energy

Date Signed

ENCLOSURE 1

Analytical Results for Sample Collected from Unremediated Nitrate Salt-Bearing Waste Container 72672

EPC-DO: 18-174

LA-UR-18-23302

Date: APR 2 3 2018

Los Alamos
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memorandum

Actinide Analytical Chemistry

To/MS: David Funk, ADEP, MS J910
Randy Erickson, ADEP, MS J910
From/MS: Rebecca Chamberlin, C-AAC, MS G740 RCC
Pat Martinez, C-AAC, MS G740 PMM 4/10/18
Phone: 7-1841/5-1646
Symbol: C-AAC-18-0016
Date: 4/11/2018

SUBJECT: Analytical Results for Drum 72672 UNS Liquid Sample (Pre-Treatment)

Sample Summary			
Drum #	**72672**		
Type of Sample	Pre-Treatment UNS liquid sample		
Sample ID	UNS SAMPLE B		
Sample collection date	2/20/18		
Analysis start date	3/14/18		
Sample description	Liquid sample from UNS drum 72656. The liquid had a rusty brownish color with suspended solids. All analysis data is reported on a weight basis.		
Volume Collected	~ 30 mL		
pH Measurement	1.6		
Density	1.400 ± 0.002 (0.12%) g/cm^3		
Radionuclides (NDA, SNAP)	**nCi/g**	**µg/g**	**(% uncertainty)***
Am 241	1.86E+05	55.1	3.2
Np 237	2.42E+00	3.5	3.2
Pu 239	3.95E+03	64.5	3.4
Pu 241	4.40E+03	0.04	16.0

Anions (Ion Chromatography)**	**µg/g Uncertainty +/- 10% except where noted*****
Nitrate (NO_3^-)	366,000 (36.6 wt%)
Nitrite (NO_2^-)	Not Detected
Chloride (Cl^-)	1400
Fluoride (F^-)	1200
Sulfate (SO_4^{2-})	630
Oxalate ($C_2O_4^{2-}$)	22,000 (2.2 wt%)

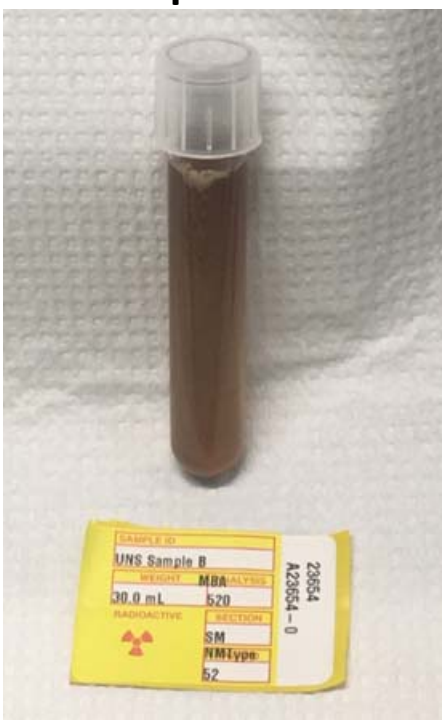
RCRA Metals (ICP-MS/AES)	**µg/g Uncertainty +/- 10% except where noted*** **
Silver (Ag)	0.6
Arsenic (As)	4.4
Barium (Ba)	26
Cadmium (Cd)	29
Chromium (Cr)	190
Mercury (Hg)	0.17
Lead (Pb)	20,000 (2.0 wt%)
Selenium (Se)	6.4
Cations (ICP-MS/AES)	**µg/g Uncertainty +/- 10% except where noted*** **
Sodium (Na)	40,000 (4.0 wt%)
Magnesium (Mg)	30,000 (3.0 wt%)
Aluminum (Al)	7,300
Potassium (K)	36,000 (3.6 wt%)
Calcium (Ca)	6,400
Beryllium (Be)	7.3
Silicon (Si)	6.1
Manganese (Mn)	69
Iron (Fe)	680
Nickel (Ni)	110
Copper (Cu)	33
Zinc (Zn)	84
Undissolved Solids	**wt% (g/100 g sample)**
Trial 1 (A23654-2)	5.3%
Trial 2 (A23654-3)	1.5%
Average Undissolved	3.4%
Composition	See Attachment 1
Estimated Composition	**wt% (g/100 g sample)**
Anions	39.1%
Cations	14.1%
Undissolved	3.4%
Water	43.4%

***The NDA SNAP results are reported with 2 X standard deviation (2σ). All other uncertainties are reported as 1 X standard deviation (1σ).

****Ion chromatography was done and results calculated based on the units of µg/mL. The values were converted to µg/g using the density of the solution.

*****Measurement uncertainty is 10% for anions and 10% for cations/RCRA. Uncertainties in excess of these values may be a result of sample inhomogeneity.

Sample Photo



UNS SAMPLE B

Labware LIMS# 23654. Analytical procedures and work instructions used:

1) ANC 212, Ion Chromatography
2) ANC 102, Inductively Coupled Plasma—Mass Spectrometry Using the VG Elemental Plasma Quad
3) ANC 221, Operating the Jobin-Yvon (JY) Inductively Coupled Plasma – Atomic Emission Spectrometer
4) WI-5, Analytical Sample Receipt, Subsampling, and Distribution within Analytical Chemistry
5) WI-30, Chemical Analysis, Characterization and Research
6) WI-42, Radiochemical Research and Development at CMR
7) ANC1325, X-Ray Fluorescence Spectrometers in CMR

Cy: Craig Taylor, C-AAC, MS G740
C-AAC File

Attachment 1: XRF Analysis – UNS Sample B (A23654 cuts 2 & 3) Insoluble Fractions

A small amount of solid remained after dissolution for cation/RCRA analysis. The material was collected and allowed to dry, weighed and then analyzed by x-ray fluorescence (XRF) spectroscopy. The insoluble fractions of the two sample cuts were transferred to XRF cups and sealed with 4 micron Prolene film. A cotton pad was placed behind the specimens to hold them in place for analysis. The specimens were analyzed in helium using a micro-XRF instrument.

A23654-2

Two different chunks of the cut were analyzed, and standard-less semi-quantitative analysis was performed on each chunk.

	Chunk 1	Chunk 2
Elem:	Wt%	Wt%
Mg	20.8	21.2
Al	4.3	3.9
P	0.2	0.3
K	49.7	48.4
Ca	11.8	17.1
Cr	0.4	0.6
Fe	1.5	2.3
Ni	0.2	0.2
Zn	0.1	0.1
Pb	11.0	5.7

Elements with Z ≤ 11 (Na) could not be detected with the instrumental parameters used. This standard-less semi-quant method is most accurate when the concentration of all elements present are input into the mathematic model. Since N, O, and Na could not be detected, significant quantitative error was introduced, but relative weight percentages could still be determined and compared between the two chunks.

A23654-3

One large chunk was available for analysis, and two different spots on the chunk were analyzed.

	Spot 1	Spot 2
Elem:	Wt%	Wt%
Mg	18.3	8.3
Al	7.5	4.6
P	0.6	0.1
K	39.2	24.3
Ca	20.8	7.0
Cr	0.9	0.2
Fe	4.5	0.5
Ni	0.2	0.1
Zn	0.1	0.1
Pb	7.9	54.8

There was a noticeable difference in the elemental concentrations between the two spots analyzed. Also, A23654-3 had a slight yellow color, while A23654-2 was whiter in color.

ENCLOSURE 2

Comparison Table of Expected Chemical Constituents/Properties

EPC-DO: 18-174

LA-UR-18-23302

Date: APR 2 3 2018

Expected Chemical Constituents/Properties of Pre-Treatment Nitrate Salt-Bearing Waste

Analyte	Analysis Results	Expected Range within Waste Stream	Unit
Nitrate	36.6 %	20-70	%
Lead	2.0 %	0-40	%
Water	43.4 %	10-30	%
Sodium	4.0 %	0-25	%
Aluminum	7,300 ppm	0-10,000	ppm
Calcium	6,400 ppm	0-10,000	ppm
Iron	680 ppm	0-10,000	ppm
Magnesium	30,000 ppm	0-50,000	ppm
Potassium	36,000 ppm	0-10,000	ppm
Arsenic	4.4 ppm	0-1	ppm
Barium	26 ppm	0-10	ppm
Beryllium	7.3 ppm	0-1	ppm
Cadmium	29 ppm	0-100	ppm
Chromium	190 ppm	0-1,000	ppm
Copper	33 ppm	0-1,000	ppm
Gallium	Not detected	0-1,000	ppm
Mercury	0.17 ppm	0-1	ppm
Nickel	110 ppm	0-1,000	ppm
Selenium	6.4 ppm	0-1	ppm
Silicon	6.1 ppm	0-1,000	ppm
Silver	0.6 ppm	0-1	ppm
Chloride	1,400 ppm	0-1,000	ppm
Fluoride	1,200 ppm	0-1,000	ppm
Nitrite	Not detected	0-10,000	ppm
Oxalate	2.2 %	0-1	%
Sulfate	630 ppm	0-2,500	ppm
pH	1.6	0-7	pH
Organic Matter	Not applicable	5-90	%