Los Alamos NATIONAL LABORATORY EST 1943

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Environmental Protection & Compliance Division
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Date: SEP 1 1 2017
Symbol: EPC-DO: 17-356
LA-UR: 17-27979
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 Second 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 second pre-treatment composite sample (from container 69490) was collected on July 13, 2017.

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. Most constituents and properties were comparable to the expected ranges for the waste stream. The expected ranges for the remediated nitrate salt-bearing waste stream were developed by the Permittees from the ranges of the surrogate materials utilized while developing the treatment method for nitrate salt waste.

The concentration of nitrate within the sample was 11.4% and less than the expected concentration range. While the expected concentration of nitrates (20-70%) is based on the anticipated processes that were used in creating the remediated nitrate salt-bearing waste, the sophistication of the mixing and associated record-keeping was of low quality. As a result, it is possible that the mixing was not adequate, leading to samples

with higher than expected organic concentrations. It is also possible that higher concentrations of *sWheat Scoop*® were used, leading to overall lower nitrate values.

Additionally, for both containers 68685 and 69490, the sulfate ion concentration was higher than anticipated. In reviewing data for surrogate evaporator bottoms (*Waste-Form Development for Conversion to Portland Cement at Los Alamos National Laboratory (LANL) Technical Area 55 (TA-55)*, Reference 1 for EPC-DO-16-139), the expected values originally predicted were much lower than those used in surrogate development in the past, which are indicative of expected anions in solution. The concentrations are in line with expected concentrations from prior surrogate development and do not affect treatment. As a result of this reanalysis, the expected sulfate concentrations are changed in Enclosure 2 from 0-100 ppm to 0-2,500 ppm.

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,

John C. Bretzke
Division Leader

Sincerely,

Arturo Q. Duran
Permitting and Compliance Manager

JCB/AQD/MPH:am

Enclosure(s): 1) Analytical Results for Sample Collected from Remediated Nitrate Salt-Bearing Waste Container 69490
2) Comparison Table of Expected Chemical Constituents/Properties

Copy: Laurie King, USEPA/Region 6, Dallas, TX (E-File)
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Document: Analytical Results for 69490
Date: September 2017

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.

9-6-17

John C. Bretzke
Division Leader
Environmental Protection and Compliance Programs
Los Alamos National Laboratory

Date Signed

9-8-2017

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 Remediated Nitrate Salt-Bearing Waste Container 69490

EPC-DO: 17-356

LA-UR-17-27979

Date: SEP 1 1 2017

Los Alamos
NATIONAL LABORATORY
EST. 1943

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 8/30/17
Phone: 7-1841/5-1646

Symbol: C-AAC-17-0062
Date: 08/30/2017

SUBJECT: Analytical Results for Drum 69490 Pre-Treatment Composite Sample

Sample Summary			
Drum #	**69490**		
Type of Sample	Pre-Treatment RNS		
Sample collection date	07/13/2017		
Analysis start date	07/26/2017		
Sample description	RNS material composite prepared from equal portions of heterogeneous solid Top, Middle and Bottom drum samples.		
pH (1 g solid / 25 mL water)	4.2		
Calculated pH of interstitial liquid	2.0		
Weight Loss Determination	**% weight loss**		**(% uncertainty)**
≤ 110 °C	13.9 ± 0.1		(0.6%)
≤ 600 °C	86.3 ± 0.7		(0.9%)
Radionuclides (NDA, SNAP)	**nCi/g**	**µg/g**	**(% uncertainty)***
Am 241	1.09E+05	33	(4.9%)
Am 243	3.64E+01	0.2	(5.1%)
Np 237	1.39E+00	2.0	(5.1%)
Pu 239	1.75E+04	289	(5.0%)
Pu 241	2.27E+04	0.2	(10.7%)
Anions (Ion Chromatography)	**µg/g +/- 10%**		
Nitrate (NO_3^-)	114000 (11.4 wt%)		
Nitrite (NO_2^-)	41		
Chloride (Cl^-)	650		
Fluoride (F^-)	68		
Sulfate (SO_4^{2-})	1800		
Oxalate ($C_2O_4^{2-}$)	260		

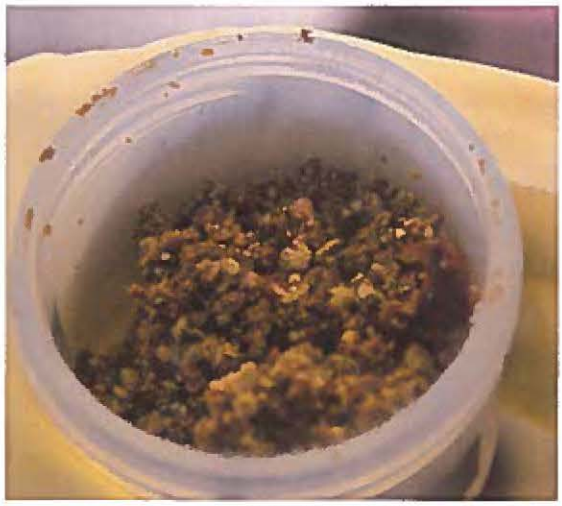
RCRA Metals (ICP-MS/AES)	µg/g +/- 20% except where noted**	
Silver (Ag)	0.05	(28%)
Arsenic (As)	< 0.6	
Barium (Ba)	< 4	
Cadmium (Cd)	1	
Chromium (Cr)	86	(24%)
Mercury (Hg)	< 0.1	
Lead (Pb)	7300	
Selenium (Se)	0.1	
Cations (ICP-MS/AES)	**µg/g +/- 20% except where noted****	
Sodium (Na)	36700 (3.67 wt%)	
Aluminum (Al)	1900	(30%)
Calcium (Ca)	6000	(26%)
Potassium (K)	3000	
Magnesium (Mg)	7100	(21%)
Silicon (Si)	13	(39%)
Iron (Fe)	89	
Zinc (Zn)	41	
Beryllium (Be)	0.3	(29%)
Manganese (Mn)	48	
Estimated Composition	**wt% (g/100 g sample)**	**(% uncertainty)**
Anions	11.6 ± 0.2	(1.8%)
Cations	6.2 ± 0.3	(4.3%)
Water	13.9 ± 0.1	(0.6%)
Calculated Organic Material (combustible)	63.9 ± 1.0	(1.5%)
Undissolved: There was undissolved material that contained both lead and iron identified by XRF. These metals are not leachable from the parent RNS material.		
Oxidizers (as NO_2^- + NO_3^-)	11.4 ± 0.2	(1.9%)
Oxidizers (as $NaNO_2$ + $NaNO_3$)	15.6 ± 0.3	(1.9%)

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

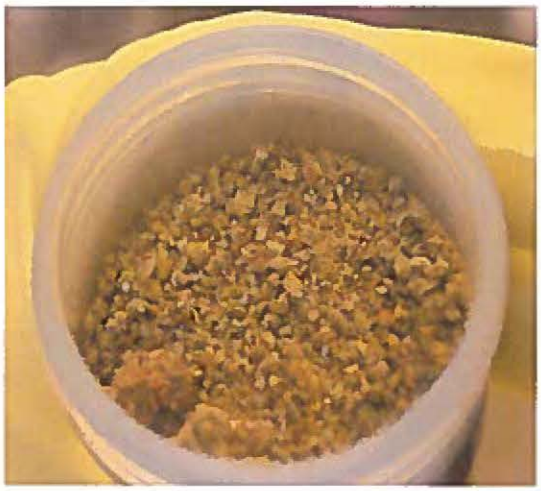
**Measurement uncertainty is 10% for anions and 20% for cations/RCRA. Uncertainties in excess of these values may be a result of sample inhomogeneity.

Sample photos

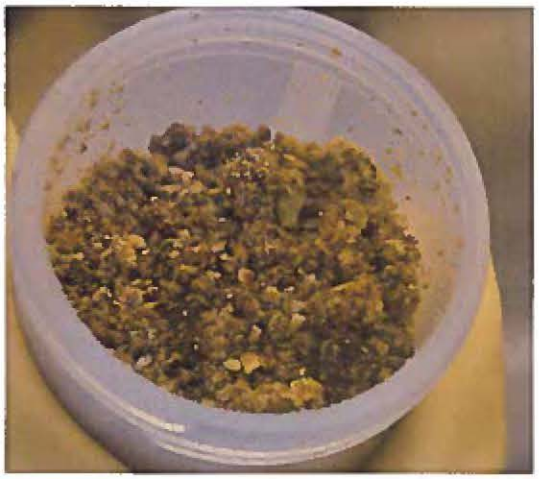
69490-TOP



69490-MIDDLE



69490-BOTTOM



69490 Composite

Labware LIMS# 22676. 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) NF-ANC-124, Nuclear Materials-Weight Loss Determination
8) WI-56. Scanning Electron Microscopy
9) ANC1325, X-Ray Fluorescence Spectrometers in CMR

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

ENCLOSURE 2

Comparison Table of Expected Chemical Constituents/Properties

EPC-DO: 17-356

LA-UR-17-27979

Date: SEP 1 1 2017

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

Analyte	Analysis Results	Expected Range within Waste Stream	Unit
Nitrate	11.4 %	20-70	%
Lead	0.73 %	0-40	%
Water	13.9 ± 0.1 %	10-30	%
Sodium	3.67 %	0-25	%
Aluminum	1,900 ppm	0-10,000	ppm
Calcium	6,000 ppm	0-10,000	ppm
Iron	89 ppm	0-10,000	ppm
Magnesium	7,100 ppm	0-50,000	ppm
Potassium	3,000 ppm	0-10,000	ppm
Arsenic	<0.6 ppm	0-1	ppm
Barium	< 4 ppm	0-10	ppm
Beryllium	0.3 ppm	0-1	ppm
Cadmium	1 ppm	0-100	ppm
Chromium	86 ppm	0-1000	ppm
Copper	Not measured	0-1000	ppm
Gallium	Not measured	0-1000	ppm
Mercury	< 0.1 ppm	0-1	ppm
Nickel	Not measured	0-1000	ppm
Selenium	0.1 ppm	0-1	ppm
Silicon	13 ppm	0-1000	ppm
Silver	0.05 ppm	0-1	ppm
Chloride	650 ppm	0-1000	ppm
Fluoride	68 ppm	0-1000	ppm
Nitrite	41 ppm	0-1000	ppm
Oxalate	0.026 %	0-1	%
Sulfate	1,800 ppm	0-2,500	ppm
pH of moistened solid	4.2	0-7	pH
Organic Matter	63.9 ± 1.0 %	5-90	%