ESHID-602784

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Los Alamos Field Office
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(505) 665-5820/Fax (505) 665-5903

Date: DEC 1 2 2017
Symbol: EPC-DO: 17-533
LA-UR: 17-31065
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 Fifth 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 fifth pre-treatment composite sample (from container 69559) was collected on October 17, 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. 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. Most constituents and properties were comparable to the expected ranges for the waste stream.

The sample collected from container 69559 was wetter than the previous four pre-treatment samples that have been analyzed. Additionally, the salt mixture within this sample was composed of primarily Magnesium, Potassium, and Calcium, rather than the Sodium mixture that is expected to make up the waste salts. The Barium concentration within this sample is greater than the expected range for remediated nitrate salt-bearing waste (this is not that surprising given the large make-up of rare earth salts in this sample;

barium is an expected impurity). However, this does not affect the treatment process or the characterization of the waste. The waste has already been characterized to include the Environmental Protection Agency (EPA) Hazardous Waste Number for Barium (D005) and the approved treatment process does not include the removal of this characterization from the waste stream.

Lastly, the concentration of Fluoride in the sample collected from container 69559 was four times the expected values as listed in Enclosure 2. The four previously sampled empty nitrate salt parent containers (*Analytical Chemistry and Materials Characterization Results for Debris Recovered from Four Nitrate Salt Waste Drums*, Reference 4 for EPC-DO-16-139), included varying concentrations of Fluoride within the samples (up to 1,200 parts per million [ppm]). This concentration, when combined with the change to the salt mixture, can be attributed to experimental variation in the processes conducted in the generation of the evaporator bottom waste stream. As noted in previous result summaries, a complete classified record review of all original bags placed into the nitrate salt waste containers was not conducted for the waste stream. The level of effort that would have been expended would not have changed the overall characterization or the stabilization method of the waste stream because the waste streams are similar.

None of the variances to expected values within this waste sample have any bearing on the effectiveness of the stabilization treatment process and do not change the waste characterization for remediated nitrate salt-bearing waste. 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:am

Enclosure(s): 1) Analytical Results for Sample Collected from Remediated Nitrate Salt-Bearing Waste Container 69559
2) Comparison Table of Expected Chemical Constituents/Properties

Copy: Laurie King, USEPA/Region 6, Dallas, TX (E-File)
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Siona Briley, NMED/HWB, Santa Fe, NM, (E-File)
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DEC 13 2017
NMED
Hazardous Waste Bureau

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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.

12/18/2018

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

Date Signed

for

12-12-2017

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 69559

EPC-DO: 17-533

LA-UR-17-31065

Date: DEC 12 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
Pat Martinez, C-AAC, MS G740 pm 12/4/17
Phone: 7-1841/5-1646
Symbol: C-AAC-17-0077

Date: 11/29/2017

SUBJECT: Analytical Results for Drum 69559 Pre-Treatment Composite Sample

Sample Summary			
Drum #	**69559**		
Type of Sample	Pre-Treatment RNS		
Sample collection date	10/17/17		
Analysis start date	10/24/17		
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)	3.9		
Calculated pH of interstitial liquid	2.0		
Weight Loss Determination	**% weight loss**		**(% uncertainty)**
≤ 110 °C	30.38 ± 0.16		(0.5%)
≤ 600 °C	84.42 ± 0.29		(0.3%)
Radionuclides (NDA, SNAP)	**nCi/g**	**µg/g**	**(% uncertainty)***
Am 241	8.76E+04	26	(5.2%)
Am 243	1.61E+00	0.01	(5.5%)
Np 237	9.40E-01	1.3	(5.5%)
Pu 239	7.22E+03	117	(5.5%)
Pu 240	1.34E+03	5.9	(37%)
Pu 241	6.90E+03	0.1	(15%)

Anions (Ion Chromatography)	**µg/g +/- 10% except where noted****	
Nitrate (NO_3^-)	290,000 (29.0 wt%)	(10.6%)
Nitrite (NO_2^-)	96	(40%)
Chloride (Cl^-)	700	(44%)
Fluoride (F^-)	4300	
Sulfate (SO_4^{2-})	230	(18%)
Oxalate ($C_2O_4^{2-}$)***	3500	

RCRA Metals (ICP-MS/AES)	**µg/g +/- 20% except where noted****	
Silver (Ag)	0.02	
Arsenic (As)	0.14	
Barium (Ba)	16	
Cadmium (Cd)	5.6	
Chromium (Cr)	165	
Mercury (Hg)	0.23	
Lead (Pb)	2350	
Selenium (Se)	< 0.04	
Cations (ICP-MS/AES)	**µg/g +/- 20% except where noted****	
Sodium (Na)	6400	
Aluminum (Al)	4600	
Calcium (Ca)	14,500 (1.45 wt%)	
Potassium (K)	17,000 (1.7 wt%)	
Magnesium (Mg)	22,300 (2.23 wt%)	
Silicon (Si)	210	
Iron (Fe)	130	(22%)
Zinc (Zn)	65	
Beryllium (Be)	< 0.6	
Manganese (Mn)	71	
Nickel (Ni)	310	
Copper (Cu)	60	
Estimated Composition	**wt% (g/100 g sample)**	**(% uncertainty)**
Anions	29.9 $\pm$ 3.0	(10.1%)
Cations	6.5 $\pm$ 0.3	(5.3%)
Water	30.4 $\pm$ 0.2	(0.5%)
Calculated Organic Material (combustible)	32.3 $\pm$ 2.7	(8.5%)

Undissolved:

The major elements detected were: Fe, Si, P, K, Ca, and Cr. Other elements detected included: S, Ti, Ni, Cu, Zn, Pb, U, Pu, and Zr; Ni, Cu, and Zn were probably from the X-ray detector collimator.

Oxidizers (as NO_2^- + NO_3^-)	29.0 $\pm$ 3.1	(10.6%)
Oxidizers (as KNO_2 + KNO_3)	47.3 $\pm$ 5.0	(10.6%)
Oxidizers (as $Mg(NO_2)_2$ + $Mg(NO_3)_2$)	34.7 $\pm$ 3.7	(10.6%)
Oxidizers (as $Ca(NO_2)_2$+ $Ca(NO_3)_2$)	38.4 $\pm$ 4.0	(10.6%)

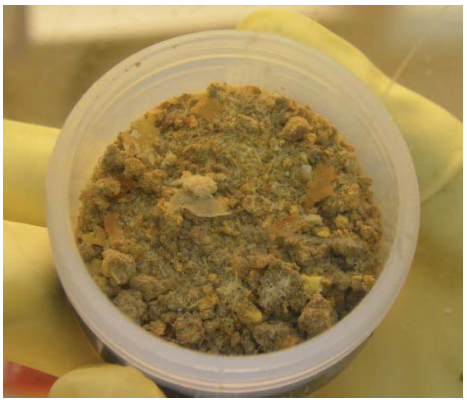
*The NDA SNAP results are reported with 2 X standard deviation (2σ). All other uncertainties are reported as 1 X standard deviation (1σ).

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

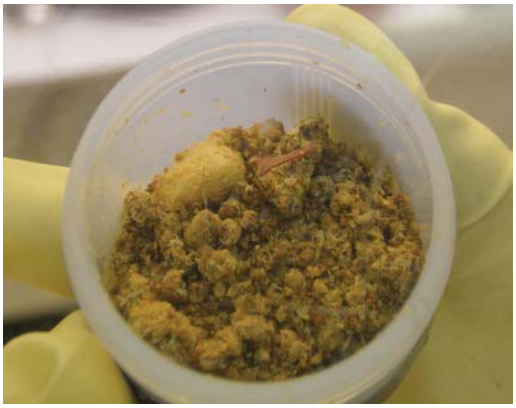
***The oxalate value is tentative awaiting confirmation using a new check standard.

Sample Photos

69559-TOP



69559-MIDDLE



69559-BOTTOM

69559 Composite

Labware LIMS# 22933. 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) 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: 17-533

LA-UR-17-31065

Date: DEC 12 2017

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

Analyte	Analysis Results	Expected Range within Waste Stream	Unit
Nitrate	29 wt%	20-70	%
Lead	0.235 wt%	0-40	%
Water	30.4 ± 0.2wt%	10-30	%
Sodium	0.64 wt%	0-25	%
Aluminum	4,600 ppm	0-10,000	ppm
Calcium	14,500 ppm	0-10,000	ppm
Iron	130 ppm	0-10,000	ppm
Magnesium	22,300 ppm	0-50,000	ppm
Potassium	17,000 ppm	0-10,000	ppm
Arsenic	0.14 ppm	0-1	ppm
Barium	16 ppm	0-10	ppm
Beryllium	<0.6 ppm	0-1	ppm
Cadmium	5.6 ppm	0-100	ppm
Chromium	165 ppm	0-1000	ppm
Copper	60	0-1000	ppm
Gallium	Not measured	0-1000	ppm
Mercury	0.23 ppm	0-1	ppm
Nickel	310	0-1000	ppm
Selenium	<0.04 ppm	0-1	ppm
Silicon	210 ppm	0-1000	ppm
Silver	0.02 ppm	0-1	ppm
Chloride	700 ppm	0-1000	ppm
Fluoride	4,300 ppm	0-1000	ppm
Nitrite	96 ppm	0-1000	ppm
Oxalate	0.35 %	0-1	%
Sulfate	230 ppm	0-10,000	ppm
pH of moistened solid	3.9	0-7	pH
Organic Matter	32.3 ± 2.7 wt%	5-90	%