ESHID-603199

Los Alamos NATIONAL LABORATORY EST 1943

EM-LA

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Date: SEP 2 7 2018
Symbol: EPC-DO: 18-350
LA-UR: 18-28818
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: **Final Nitrate Salt Waste Treatment Summary, Los Alamos National Laboratory**

Dear Mr. Kieling:

The purpose of this letter is to provide final information regarding the completion of treatment of remediated and unremediated nitrate salt waste located at the Los Alamos National Laboratory (LANL) in 2017 and 2018. The LANL Hazardous Waste Facility Permit, issued by the New Mexico Environment Department-Hazardous Waste Bureau (NMED-HWB), authorizes the U.S. Department of Energy (DOE); Los Alamos National Security, LLC (LANS); and Newport News Nuclear BWXT-Los Alamos, LLC (N3B) to manage, store, and treat hazardous waste at LANL. The Permit includes treatment by stabilization in containers at the Technical Area (TA) 50, Building 69, Waste Characterization, Reduction, and Repackaging Facility (WCRRF). In accordance with the Permit, DOE and LANS successfully completed treatment of waste within 87 remediated or unremediated nitrate salt waste containers at WCRRF between May 18, 2017 and March 13, 2018. Containers that hold treated nitrate salt-bearing waste or segregated debris waste are located at TA-54 and are undergoing the Waste Isolation Pilot Plant (WIPP) certification process for ultimate shipment off-site.

The documentation contained within *Transmittal of Reports Regarding Treatment Effectiveness for Stabilization of Nitrate Salt Waste Streams* (ADESH-16-076), details the extensive surrogate testing that was conducted to develop the waste treatment/segregation processes. Included within the submittal was a report *Summary Report of Laboratory Testing to Establish the Effectiveness of Proposed Treatment Methods for Unremediated and Remediated Nitrate Salt Waste Streams*, that included summaries of the testing conducted to validate that the treatment methods proposed for both the unremediated and remediated nitrate salt-bearing waste were effective at safely removing the U.S. Environmental Protection Agency (EPA) Hazardous Waste Numbers D001 and D002 for ignitability and corrosivity hazardous characteristics. These studies also demonstrated that the proposed volumetric quantities for the mixtures are sufficient to ensure removal of the ignitability and corrosivity characteristics as required for disposal at

the Waste Isolation Pilot Plan (WIPP). Testing was conducted by an independent contract laboratory, Southwest Research Institute (SwRI), located in San Antonio, Texas, using nonradioactive surrogate samples to avoid worker safety risks associated with testing, packaging, and transporting samples of actual radioactive waste materials. The surrogate samples utilized included varying quantities of nitrate (expected range from 20-70%) to confirm treatment effectiveness on a wide range of concentrations. Additional characterization and treatment testing activities were conducted on-site at LANL and are detailed in documents previously provided as *Response to Ordered action 2/3, Attachment A to Settlement Agreement and Stipulated Final Order HWB-14-20, Los Alamos National Laboratory* (ADESH-16-043) and *Transmittal of Reports Regarding Treatment Effectiveness for Stabilization of Nitrate Salt Waste Streams* (ADESH-16-076).

Surrogate testing concluded the following, and processing procedures for nitrate salt-bearing waste were developed accordingly.

- With the exception of cellulose-based absorbent rags (like WypAll® rags), all of the tested debris material (cardboard, plastic, metal, etc.) passed the identified test methods with no treatment necessary.
- When liquid surrogates were evaluated, a volume ratio of 1 part waste to 3 parts zeolite was established to be effective at eliminating the hazardous characteristics of ignitability and corrosivity, designated as U.S. Environmental Protection Agency (EPA) Hazardous Waste Numbers D001 and D002, respectively.
- For solids, stabilization using zeolite in a volume ratio of 1 part waste to 3 parts zeolite (invoking water as a processing aid), was found to be effective at eliminating both characteristics of D001 and D002 for these materials.
- Cellulose-based absorbent rags underwent additional testing and a method for maceration of rags in water followed by addition of zeolite was developed for treatment of cellulose-based material.

The Permittees were issued authorization to treat nitrate salt-bearing waste on July 25, 2016. The Permit required the collection of eight pre-treatment samples (six solid and two liquid) and collection of samples from a minimum of 1% of treated waste containers. Four post-treatment samples were collected from the 487 containers of treated nitrate salt-bearing waste that were generated. The concentrations of nitrate (2.9% - 9.7%) and organic matter (6.2% - 11.4%) measured in post-treatment samples were less than quantities expected for waste prior to treatment and analytical data for pre-treatment samples. These samples were collected to provide data to ensure that the characterization of the waste stream was adequate and that treatment of the waste was complete. A summary of the analytical data from these samples was provided in *Transmittal of Nitrate Salt Waste Analytical Results Summary, Los Alamos National Laboratory Hazardous Waste Facility Permit* (EPC-DO: 18-233). The constituents measured within both pre- and post-treatment samples fall within the ranges established by the surrogate testing.

Utilizing processes developed from the recipes tested on surrogate waste streams, the Permittees successfully treated nitrate salt-bearing waste and segregated debris waste from the remediated or unremediated nitrate salt waste containers. Processes utilized for the treatment of remediated and unremediated nitrate salt-bearing waste are outlined in Permit Part 7 and Permit Attachment A, Section A.3.1. After each container of waste was through processing, the EPA Hazardous Waste Numbers D001 and D002 were removed from the characterization documentation for each of the newly generated treated waste containers, the segregated waste debris containers, and the RCRA-empty original remediated or unremediated nitrate salt-bearing waste container.

Ignitability and corrosivity characterizations were removed because the treatment and segregation processes outlined in the Permit were adequately followed for each waste container. Additionally, analyses of post-treatment waste show quantities of organic matter and nitrate at expected levels, removing the risk that the waste is an oxidizer and justifying the removal of the ignitability characteristic. Lastly, no liquids were left within any of the waste containers; therefore, none of the waste is characterized as corrosive.

Although many of the constituents in the nitrate salt-bearing waste stream are variable, data from post-treatment samples indicate a generalized increase in insoluble metals and cations. This increase may be attributable to the addition of the zeolite to the waste. Enclosures 1 and 2 provide documentation about the zeolite from the manufacturer.

If you have comments or questions regarding this submittal, please contact Arturo Duran (Environmental Management) at (505) 665-7772 or Patrick L. Padilla (LANS) at (505) 667-3932.

Sincerely,

Enrique Torres
Division Leader

Sincerely,

Arturo Q. Duran
Permitting and Compliance Manager

ET/AQD/PLP:

Enclosures:
1) Analyses Documentation of Zeolite from KMI Zeolite Inc.
2) Product Data Sheet from KMI Zeolite Inc.

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ENCLOSURE 1

Analyses Documentation of Zeolite from KMI Zeolite Inc.

EPC-DO: 18-350

LA-UR-18-28818

Date: SEP 2 7 2018

LORING LABORATORIES (ALBERTA) LTD.
629 Beaverdam Road N.E. Calgary, Alberta T2K 4W7
Tel : (403) 274-2777 Fax : (403) 275-0541
Email: loringlabs@telus.net www.loringlabs.net

ISO 9001:2008 Certified

TO: KMI Zeolite Inc

File No : 59521
Date : February 26, 2016

Attn: Conrad K. Wagenaar

Certificate of Assay

Sample No.	N %
"Assay Analysis"	
14x30	<0.01
14x30 Dup.	<0.01
14x30 Trip.	<0.01
	Sample received on: Feb. 24, 2016

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples:

Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

FORM ASYC-015

ISO9001:2008 Certified

Loring Laboratories (Alberta) Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 403- 274-2777 Fax: 403-275-0541
loringlabs@telus.net

FILE: 5 9 5 2 1

DATE: February 26, 2016

TO: KMI Zeolite Inc

Attn: Conrad K. Wagenaar

30 ELEMENT ICP ANALYSIS

Sample No.	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P %	Pb ppm	Sb ppm	Sr ppm	Th ppm	Ti %	U ppm	V ppm	W ppm	Zn ppm	Zr ppm
14x30	<0.5	5.57	17	333	721	3	1.97	1	1	2	8	0.60	1.98	8	0.30	315	6	2.01	3	0.01	28	<1	256	17	0.05	<1	4	<1	81	71
14x30 Dup.	<0.5	5.74	16	376	738	3	1.95	1	1	1	8	0.62	2.02	9	0.27	293	6	2.09	3	0.01	38	<1	250	17	0.06	<1	4	<1	75	73
14x30 Trip.	<0.5	5.68	15	452	712	3	1.99	1	1	1	8	0.59	2.00	9	0.28	282	6	2.09	3	0.01	26	<1	248	16	0.06	<1	4	<1	86	74
Check 14x30	<0.5	5.64	16	315	717	2	1.96	1	1	3	7	0.59	2.07	9	0.29	305	6	2.09	3	0.01	27	<1	246	17	0.06	<1	4	<1	79	72
Blank	<0.5	<0.01	<1	<1	<1	<1	<0.01	<1	<1	<1	<1	<0.01	<0.01	<1	<0.01	<1	<1	<0.01	<1	<0.01	<1	<1	<1	<1	<0.01	<1	<1	<1	<1	<1

* 0.500 Gram sample is total digested with multi acid and ICP finish.

* Sample received on Feb. 24, 2016

Certified by:

ENCLOSURE 2

Product Data Sheet from KMI Zeolite Inc.

EPC-DO: 18-350

LA-UR-18-28818

Date: SEP 2 7 2018

KMI
ZEOLITE

PRODUCT DATA SHEET

High Purity 97% Clinoptilolite zeolite - Produced at Amargosa Valley, NV 89020

Hydrous Sodium Aluminosilicate 100% Natural Clinoptilolite

TYPICAL PROPERTIES

General Chemical Formula	Na6[Al6Si30O72]24H2O
Clinoptilolite Content	97%+
Cation Exchange Capacity (CEC)	1.6 – 2.0 meg/g
Form	Granules and powders
Shape	Angular
Color	Beige / Gray
Pore Diameter	4.0 – 7.0 angstroms
Specific Gravity	1.89
Specific Surface Area	40m2/g
Bulk Density	45 - 54 lbs/ft3
pH stability	3.0 – 10.00
Hardness	4.0 - 5.0 Mohs
Swelling Index	Nil

TYPICAL CHEMICAL ANALYSIS – CHEMISTRY OF ZEOFILL

SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	MnO	TiO2
66.7%	11.48%	0.9%	1.33%	0.27%	1.80%	3.42%	0.025%	0.13%

MAJOR EXCHANGEABLE CATIONS

Rb+	Na+	Ba+2	Mg+2	Li+	Ag+	Sr+2	Fe+3	K+	Cd+2
Cu+2	Co+3	Cs+	Pb+2	Ca+2	Al+3	NH+4	Zn+2	Hg+2	Cr+3

KMI
ZEOLITE

CERTIFICATIONS / DESIGNATIONS

Organic Materials Review Institute – ZeoFill certificate #ZEO-3722

CAS Registration : 12173-10-3 Clinoptilolite Zeolite

TSCA (USA – Toxic Substance Control Act) : No components listed.

Water Quality Association Gold Certified Supplier.

California Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986 : There are no chemicals present known to the state of California to cause cancer or reproductive toxicity.

U.S. Food and Drug Administration (USFDA), Federal Code, Title 21 : GRAS (Generally Recognized as Safe) approved under 21 CFR Part 182.2729 for use up to 2% in animal feed in according with good management practice. Zeolites are exempted from a tolerance as a solid diluents or carrier when used in accordance with good agricultural practice. (40 CFR, Part 180.1001).
KMI UltraGrow product no. kmi-3641 - OMRI Listed USDA National Organic Program Rule

EN-71-3 Safety of Toys Part 3 – Migration of Certain Elements Results – **PASS**

*Information contained herein is, to the best of our knowledge, correct. The data outlined and the statements made are intended only as a source of information.