Los Alamos
NATIONAL LABORATORY
EST. 1943

ESHID-601109

Environmental Protection Division
Environmental Compliance Programs (ENV-CP)
PO Box 1663, K490
Los Alamos, New Mexico 87545
(505) 667-0666

Date: JAN 08 2016
Symbol: ENV-DO-16-005
LA-UR: Not Applicable
Locates Action No.: Not Applicable

Mr. John E. Kieling
Hazardous Waste Bureau
New Mexico Environment Department
Santa Fe, NM 87505

Dear Mr. Kieling:

Subject: Request for Destruction of Unstable Hazardous Material at TA-49, Los Alamos National Laboratory

The purpose of this letter is to request approval by the New Mexico Environment Department's Hazardous Waste Bureau (NMED-HWB) to conduct emergency treatment (detonation) of unstable hazardous materials at Technical Area (TA) 49. The destruction will be conducted in accordance with 40 CFR 270.1(c)(3) and approval is requested for an emergency permit under 40 CFR 270.61.

The hazardous materials were identified in nonreactive packaging at TA-9-22. The Emergency Response Team was able to identify the material as explosive potential and determined that the reactive properties are unsafe and poses a considerable safety risk. Based on this, the waste will be characterized with a D003 EPA Hazardous Waste Number. Emergency Response personnel have deemed the situation an emergency and determined that treatment by open detonation is a necessary response for the hazardous material. Suitable quantities of high explosives (no more than 5 pounds net explosive weight) will be applied to all sides of the material equally. The resulting incendiary thermal effect will consume the hazardous material.

Under strict Department of Transportation (DOT) regulations, these staged chemicals are categorized as DOT 5.1, Oxidizers. They have secondary hazards as Highly Toxic Inhalation Hazards (DOT 2.3) and moisture sensitive. The primary characteristic is that they form dangerously explosive compounds in contact with water. All of the materials referenced in the solid oxidizer DOT regulations that are water sensitive become dangerously sensitive explosives when wet (i.e., DOT category 1.1A-Forbidden). In this case, the compounds that are formed are XeO3,4; ClO2,3,4,5,6,7; and HNF2. These compounds have been documented in the peer-reviewed chemical literature as treacherous explosives, in that they frequently explode without provocation. The compounds have been documented to explode upon melting, freezing, boiling or any other physical stimulation. Any physical contact with these materials, after they have been in contact with water or even atmospheric moisture, may result in a violent explosion. The power of these explosives is on the order of conventional secondary explosives, such as Pentaerythritol tetranitrate (PETN) or Research Department Explosive (RDX), due to their low molecular weight and highly positive enthalpy of formation. Enclosure 1 provides a list of chemical compounds proposed for treatment.

The hazardous material is currently being safely and securely stored at TA-9-21 Room 138 in a dry box until permission from NMED-HWB is received to conduct emergency treatment. Contingent on the weather, the hazardous material will safely be removed from the storage location and transported to TA-49 for immediate treatment. Upon completion of emergency treatment, all remaining residual material (if any) will be collected and properly managed for disposal in accordance with state and federal waste management requirements. This correspondence and the response from the NMED-HWB will be included in the Electronic Public Reading Room (EPRR).

Please contact Mark P. Haagenstad of my staff at (505) 665-2014 if additional information is desired.

Sincerely,

A R Grieggs

Anthony R. Grieggs
Group Leader
Environmental Compliance Programs (ENV-CP)
Los Alamos National Security, LLC

ARG:MPH:AMM/lm

Enclosure: 1) List of Chemical Compounds Proposed for Treatment

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ENCLOSURE 1

List of Chemical Compounds Proposed for Treatment

ENV-DO-16-005

LA-UR-16-20062

Date: JAN 0 8 2016

Date: 1/6/2016

Large PFA vials (~10 ml), tare wt. ~42. g)

ENCLOSURE 1: List of Chemical Compounds Proposed for Treatment

ALL MATERIALS ARE *VIOLENTLY* WATER-REACTIVE

A.

No.	Compound	Wt. (g)	Hydrolyzes in moist air?	Final Hydrolysis products	Hazards
1	$ClF_2^+BiF_6^-$	18.2	Y	ClOx, Bi2O3,5, HF	Explosive (ClOx), toxic (HF)
2	$N_2F_3^+BiF_6^-$	40.9	Y	HNF2, Bi2O3,5, HF	Explosive (HNF2), toxic (HF, HNF2)
3	$Cs_2^+MnF_6^-$	21.3	Y	CsOH, MnO2, F2, HF	Toxic (F2, HF)
4	$Cs^+BF_4^-$	23.6	Y	CsOH, BF3, HF	Toxic (HF, BF3)
5	$NF_4^+SbF_6^-$	13.7	Y	NF3, Sb2O3,5, HF	Toxic (HF, NF3)
6	$NF_4^+SbF_6^-$	0.1	Y	NF3, Sb2O3,5, HF	Toxic (HF, NF3)
7	$XeF_3^+SbF_6^-$	15.5	Y	XeO3, Sb2O3,5, HF	Explosive (XeO3), toxic (HF)
8	$N_2F_3^+SbF_6^-$	21	Y	HNF2, Sb2O3,5, HF	Explosive (HNF2), toxic (HF, HNF2)
9	$N_2F_3^+SbF_6^-$	28.9	Y	HNF2, Sb2O3,5, HF	Explosive (HNF2), toxic (HF, HNF2)
10	$NF_4^+SbF_6^-$	0.1	Y	NF3, Sb2O3,5, HF	Toxic (HF, NF3)
11	$ClF_2O^+BF_4^-$	12.3	Y	ClOx, BF3, HF	Explosive (ClOx), toxic (HF, BF3)
12	unlabeled	0.1			
13	$Cs_2^+MnF_6^-$	24.2	Y	CsOH, MnO2, F2, HF	Toxic (F2, HF)
14	$NF_4^+BF_4^-$	4.4	Y	NF3, BF3, F2	Toxic (NF3, BF3, F2)
15	$N_2F_3^+BiF_6^-$	20	Y	HNF2, Bi2O3,5, HF	Explosive (HNF2), toxic (HF, HNF2)
16	$XeF_3^+SbF_6^-$	39.9	Y	XeO3, Sb2O3,5, HF	Explosive (XeO3), toxic (HF)
17	$Cs^+BF_4^-$	13.8	Y	CsOH, BF3, HF	Toxic (HF, BF3)
18	$ClF_2^+BiF_6^-$	0.1	Y	ClOx, Bi2O3,5, HF	Explosive (ClOx), toxic (HF)
19	$NF_4^+SbF_6^-$	36	Y	NF3, Sb2O3,5, HF	Toxic (HF, NF3)
20	$N_2F_3^+SbF_6^-$	0.1	Y	HNF2, Sb2O3,5, HF	Explosive (HNF2), toxic (HF, HNF2)
	Subtotal (g.)	334.2			

B Small PFA vials (~ 5ml), tare wt. ~30.5 g

	Compound	Wt. (g)			
1	$N_2F_3^+BiF_6^-$	4.3	Y	HNF2, Bi2O3,5, HF	Explosive (HNF2), toxic (HF, HNF2)
2	$ClF_2^+BiF_6^-$	18.36	Y	ClOx, Bi2O3,5, HF	Explosive (ClOx), toxic (HF)
3	$NF_4^+BF_4^-$ pellet in Kel-F	2	Y	NF3, BF3, HF	Toxic (NF3, BF3, F2)
	Subtotal (g.)	24.66			

C.

	Compound	Wt. (g)			
1	Sealed Copper EFP, $N_2F_3^+SbF_6^-$	20	Y	HNF2, Sb2O3,5, HF	Explosive (HNF2), toxic (HF, HNF2). Note: material returned to PFA container
2	Sealed Copper EFP, $NF_4^+SbF_6^-$	20	Y	NF3, Sb2O3,5, HF	Toxic (HF, NF3). Note: material returned to PFA container
3	PFA Bottle with $ClF_2^+BiF_6^-$	18	Y	ClOx, Bi2O3,5, HF	Explosive (ClOx), toxic (HF)
4	U-Trap, HF/SbF_5	20	Y	HF, Sb2O3,5	Toxic (HF)
5	Jar, SbF_5	20	Y	HF, Sb2O3,5	Toxic (HF)
6	SbF compound in jar	1	Y	HF, Sb2O3,5	Toxic (HF)
7	PFA Reactor tube (white solid) has $NF_4^+BF_4^-$ as component with $Cs^+SbF_6^-$	~30 cc solids	Y	HF, Sb2O3,5, BF3, NF3	Toxic (HF, NF3, BF3)
8	Liquid HF/SbF5 in PTFE Jar	300	Y	HF, Sb2O3,5	Inhalation toxin (HF)
	Subtotal (g.)	399			

Grand total: **757.86** Net wt. of explosive-forming solids 257.56

note: HNF2 is volatile (b.p. -23 °C) but should still be considered an explosion hazard in this operation, however it is extremely unpredictable and likely to explode under many different conditions and without provocation, even in the gas phase.

note 2: ClOx is the common term of reference to describe the chlorine oxides, of which 7 are known: Cl2O, ClO2, Cl2O3, Cl2O4, Cl2O5, Cl2O6, and Cl2O7. All are extremely sensitive primary explosives.

ALL MATERIALS ARE *VIOLENTLY* WATER-REACTIVE

Item	Compound	Wt. (g)	Running Total	(Remaining)	Additional Hazards (upon hydrolysis)
5,6,10,19,C(2)	$NF_4^+SbF_6^-$	69.9	69.9	687.96	Toxic (HF, NF3), Corrosive (HF)
1,18,B(2),C(3),	$ClF_2^+BiF_6^-$	54.66	124.56	633.3	**Explosive (ClOx), toxic (HF), Corrosive (HF)**
2,15,B(1)	$N_2F_3^+BiF_6^-$	65.2	189.76	568.1	**Explosive (HNF2), toxic (HF, HNF2), Corrosive (HF)**
8,9,20,C(1)	$N_2F_3^+SbF_6^-$	70	259.76	498.1	**Explosive (HNF2), toxic (HF, HNF2), Corrosive (HF)**
7,16	$XeF_3^+SbF_6^-$	55.4	315.16	442.7	**Explosive (XeO3), toxic (HF), Corrosive (HF)**
11	$ClF_2O^+BF_4^-$	12.3	327.46	430.4	**Explosive (ClOx), toxic (HF, BF3), Corrosive (HF, BF3)**
14,B(3),C(7)	$NF_4^+BF_4^-$	6.4	333.86	424	Toxic (NF3, BF3, F2), Corrosive (BF3, F2)
3,13	$Cs_2^+MnF_6^-$	45.5	379.36	378.5	Toxic, Corrosive (F2, HF)
4,17	$Cs^+BF_4^-$	37.4	416.76	341.1	Toxic (HF, BF3), Corrosive (HF, BF3)
C(4), C(8)	HF/SbF5	320	736.76	21.1	Toxic (HF), Corrosive (HF)
C(5),C(6)	SbF5	21	757.76	0.1	Toxic (HF), Corrosive (HF)
12	Unlabled	0.1	757.86	0	Unknown