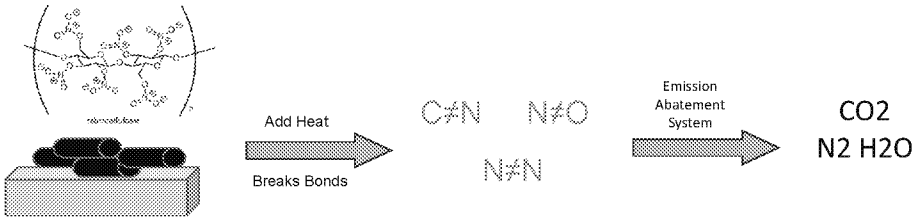
U.S. Demil, LLC

Patented "Decineration™" Thermal Process

Science of Decineration™ Technology



- In Chemistry this is called "*Decomposition*"
- The industrial embodiment of the Decineration™ process is the use of an externally heated, rotating horizontal tube which essentially duplicates the laboratory model known as "a horizontal flat plate in atmosphere".

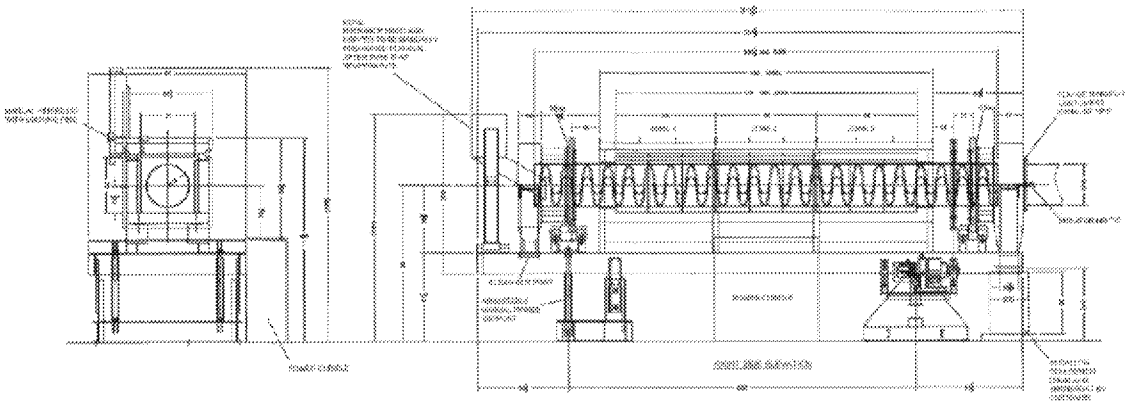
Decineration™ is a *non–incinerative*, thermal process as determined by the **US EPA Headquarters Solid Waste Division** and the **Indiana Department of Environmental Management**.

Complex, long chain, solid energetics (nitrocellulose, nitramines and nitrate esters) are ***decomposed*** into short chain, light hydrocarbon gases by fracturing the carbon-carbon, carbon-nitrogen, nitrogen-oxygen and nitrogen-nitrogen bonds.

The process occurs at ambient pressure and moderate temperature of approximately (400° - 700° F) in an externally heated rotary tube *without* contact between heating source and munitions components.

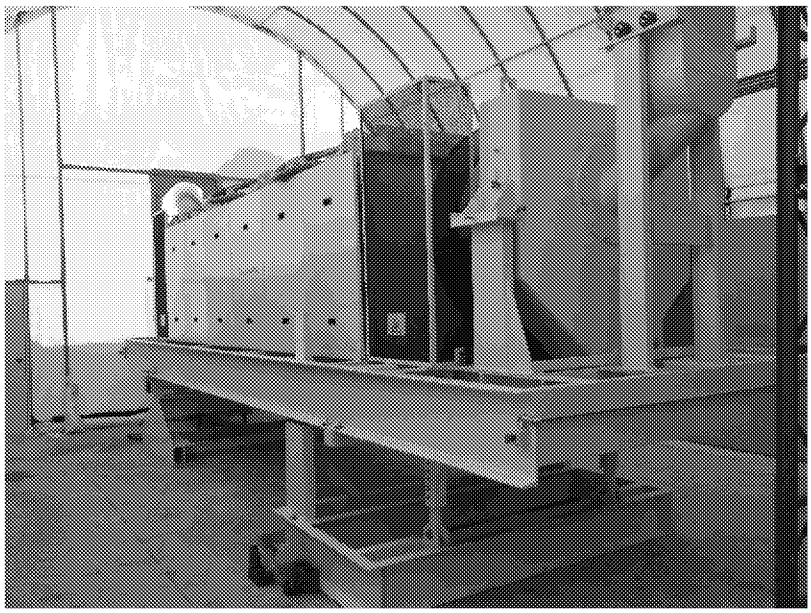
- The science of the decomposition of energetic compounds has been studied by the Military Services and Research Universities for decades; e.g., G.T. Long, Department of Chemistry, University of Utah (Thermal Analysis of High Explosives: Liquid State Decomposition of RDX) and LT K.K. Miles, Naval Postgraduate School (The Thermal Decomposition of RDX).

- The process is fully mature and has been known to industry (i.e. petrochemical) for more than a century.



Rotary Furnace built for PD-DEMIL sponsored economic study

DOTC Contract W15QKN-09-9-1001, Purchase Order No. PO10119299



Advantages

Decineration™:

- Has precise temperature and time (dwell) control
- Does not form lead oxide in the off gas
- Does not burn heavy metals such as cadmium or chrome
- Does not melt non-ferrous metals such as aluminum
- Processes the broadest spectrum of munitions of any current technology; the very definition of **OMNIVEROUS**!!!
- Proven to Meet the MACT Standards of US EPA for **NEW SOURCES**

Decineration™ gases are removed for treatment in an Emissions Abatement System (EAS), leaving behind *fully demilitarized munitions* in a "Material Determined As Safe" (MDAS) condition.

The resulting metal has been determined by QASAS certified personnel, through chemical testing, to be ***100% demilitarized***.

Unlike other technologies which can destroy the metal alloy, Decineration™ leaves metal components ready for immediate recycling and/or possible reuse.

Low Decineration™ temperatures avoid the formation toxic compounds such as dioxin.

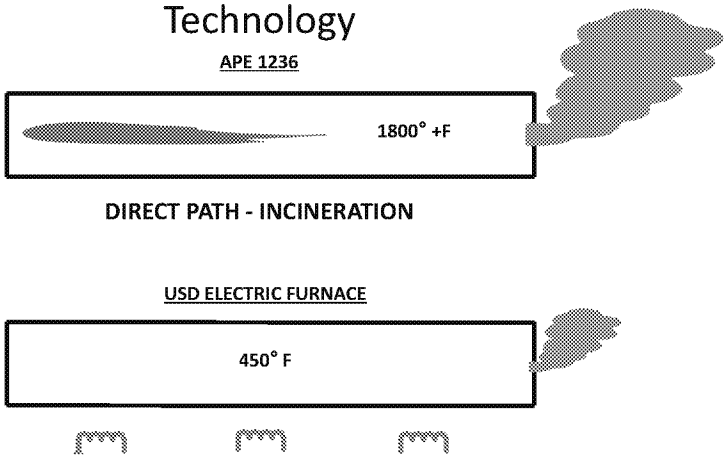
Incineration is a Legal Term defined within

US EPA Regulations

The Layman's Test: is there a **direct path** from the *heat source* to the *material* being treated?

- **IF Yes** – It is incineration
- **IF No** – It is **NOT** incineration

Rotary Kiln vs Oven Technology



WHY IS THIS IMPORTANT?

IT'S ABOUT GETTING THE **PERMIT**!!!

The USEPA and the State Regulatory agencies have not granted a permit for a new explosive waste incinerator on a US Army facility in more than 20 years.

USEPA and Indiana Environmental Management BOTH agree that DECINERATION™ is **NOT** Incineration

US EPA RCRA Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 6 2008

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

Mr. William G. Slovinski, Esq.
Energy and Environment, Twenty-One, Inc.
5000 Hopkins Ave., N.W., Suite 500
Washington, D.C. 20007

Dear Mr. Slovinski,

Thank you for your correspondence of May 8 and December 9, 2008, regarding the operation of the Wyoming process for the recovery of metals from spent shell and bags (spent shell) generated under the military munitions rule (40 CFR 266.202). We agree with your assessment, as described in your correspondence, that the recovery of metals and energy from bags, dropped spent shell, and other non-munitions destruction is recyclable materials and, therefore, does not constitute "discard." Thus, it presents no regulatory issues under RCRA. As for the bags, dropped spent shell, and other non-munitions that are "subject to recycle," and not needed to generate fuel, could be termed "operating materials." Thus, the energy recovery process is not solid waste.

In addition, based on the description of the process in your letter, we also agree that the Wyoming process for spent shell or munitions does not involve disposal of the materials and, therefore, 40 CFR 266.202(a) is inapplicable to the process. [illegible] that the new regulatory approach [illegible] (e.g., stored in bins) shell casing, from the shell holder to facilitate recovery of the two different metals, explosives recycling, dismantling, and addition of other materials recovery process.

The view of the process is as follows. There is added to the furnace in order the shell casing is opened. The controlled addition of fuel, air, steam, air, other/other energy to volatilize further the explosives, and a hydrocyclone providing the pressure is opposite to outside that made of the furnace. The fuel cells of the furnace and energy advantage for explosive recovery action from the shell casing. The furnace, the furnace with a high pressure air exchange to assure that the temperature remains in a high, stable range and does not rise in the pilot since the solutions begin to react with the bottom and still in place as the shell casing. Depending on temperature is not [illegible] to [illegible] than [illegible] to

Very important to the ability to assess the details. The energy is used to generate separation of the trifle substance and, also, to assist in the metals recovery process. It is our judgment that the incineration of the energetic dunnage or bags is outside the scope of the munitions universal waste for recycling and other purposes. This does not consider the destruction as activity that would make the process waste treatment, therefore, subject to RCRA.

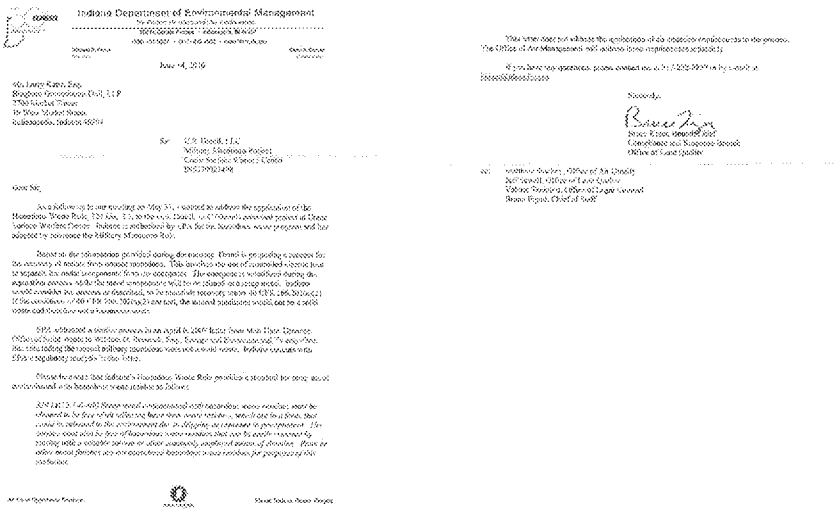
Given that you clearly have a metals recovery process and that disposition of energetic appears useful to the process, it is not necessary to consider whether the process involves burning for energy recovery as used in 40 CFR 266.202(a)(2). However, it does not appear that your process involves either burning or energy recovery.

As you are aware, EPA generally encourages States to implement their hazardous waste programs in lieu of RCRA. Thus, states retain the authority to promulgate the regulations based on state laws. Please keep in mind, however, that the RCRA rules and interpretations. It is important that you contact the State permitting authority where you intend to locate your process and assure that the process and the regulations under the specific State rules that will apply.

Sincerely,

Mike Flynn, Director
Office of Solid Waste

IDEM Letter



Indiana Department of Environmental Management

[illegible]

[illegible]

[illegible]

June 14, 2016

Mr. Larry Kates, Esq.
Bingham Greenebaum Doll, LLP
2700 Market Tower
10 West Market Street
Indianapolis, Indiana 46204

Re: [illegible]
Subject: Educational Project
Cedar Rock Sites Superfund Site
IND079024498

Dear Mr.

As a follow up to our meeting on May 31, I wanted to address the application of the Hazardous Waste Rule, 329 IAC 3, to the work Council of Governments performed at Cedar Rock Sites Workers Center. Evidence is presented that EPA for the hazardous waste program and has adopted by reference the RCRA Mixture Rule.

Based on the information provided during the meeting, Council is generating a mixture that is the mixture of waste with waste generated. This satisfies the use of contained elements that is separate from material management from the exemption. The exemption is satisfied by the application process. While the waste management will be related to a storage model, Indiana would consider the storage of the material to be a transitory storage. IC 13-18-3-2(1) If the conditions of IC 13-18-3-2(1) are met, the waste mixture would not be a solid waste and therefore not a hazardous waste.

EPA addressed a similar process in an April 8, 2009 letter from Mark Ryan (Director, Office of Solid Waste to William H. Maxwell, Esq., Senior Vice President, Environmental Management, Inc. addressing the overall military munitions rule and waste mixture. Indiana concurs with EPA's regulatory interpretation.

Please be aware that Indiana's Hazardous Waste Rule provides a standard for temporary storage of hazardous waste similar to federal:

329 IAC 3-7-2(a) Waste mixed with unregulated solid hazardous waste munitions, waste munitions, must be observed to be free of visible signs of explosion, toxic gases, or any other hazardous or explosive reaction. The waste must be delivered to the management site in shipping containers in compliance. The waste must be stored in free of hazardous waste munitions that can be applied necessary to minimize a release or other unanticipated emergency of danger. Place in other metal fences are recommended hazardous waste munitions for purposes of this subsection.

[illegible]

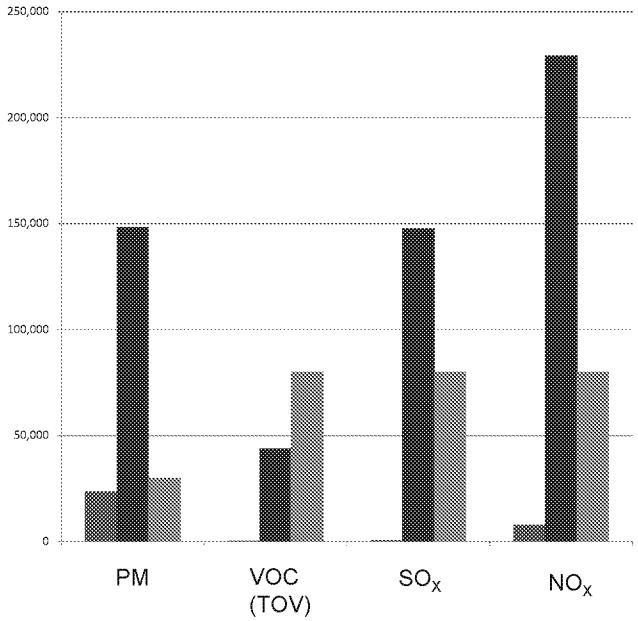
This letter does not address the applicability of the standards mentioned outside the process. The Office of Air Management will address those implications separately.

If you have any questions, please contact me at 317-232-8959 or by email at [illegible]

Sincerely,

Bruce Kizer, [illegible]
Compliance and Response Branch
Office of Land Quality

cc: [illegible], Office of Air Quality
[illegible], Office of Land Quality
[illegible], Office of Legal Counsel
Bruce Kizer, Chief of Staff



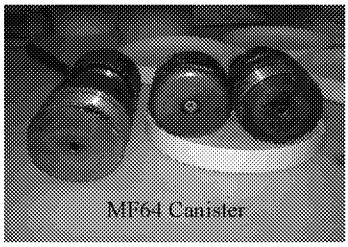
Comparative Potential Emissions of Decinerator™ vs RF-9 (APE1236) Incinerator

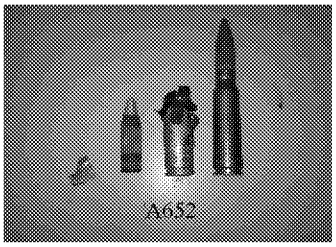
- Potential to Emit – Theoretical Uncontrolled running 24 hours per day X 356 days per year
- Pounds of munitions per hour – 1,000
- Pounds of munitions per year – 8,760,000
- DODIC used for model – A652 20MM TP-T
- All figures based upon actual emissions profiles obtained during RATA, prior DecinerationTM contracts and Nevada Operating Permit for RF-9 at HWAD

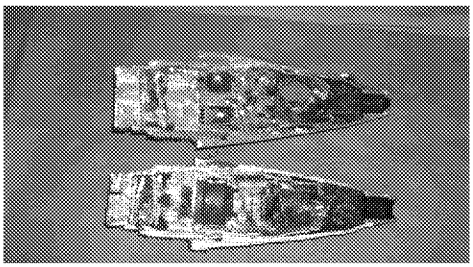
- DecinerationTM Potential to Emit Theoretical Uncontrolled (lbs/yr)
- RF-9 Incinerator Potential to Emit (lbs/yr) Note: Permit limit 500,000 lbs/yr
- PSD Air Permit Trigger (lbs/yr)

- Potential to Emit – Theoretical Uncontrolled running 24 hours per day X 356 days per year
- Pounds of munitions per hour – 1,000
- Pounds of munitions per year – 8,760,000
- DODIC used for model – A652 20MM TP-T
- All figures based upon actual emissions profiles obtained during RATA, prior DecinerationTM contracts and Nevada Operating Permit for RF-9 at HWAD

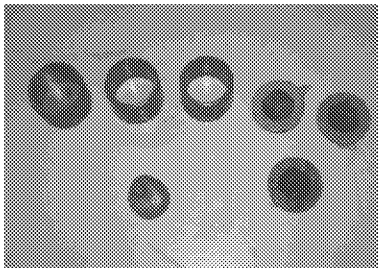
Sample DODIC's processed through Decineration™ Unit at TEAD



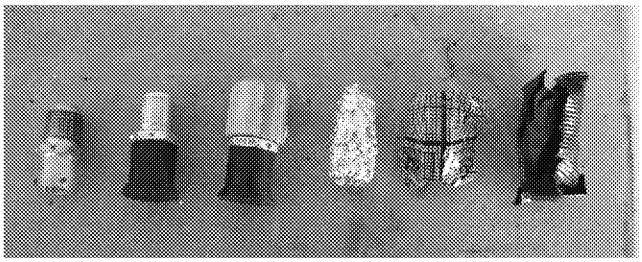




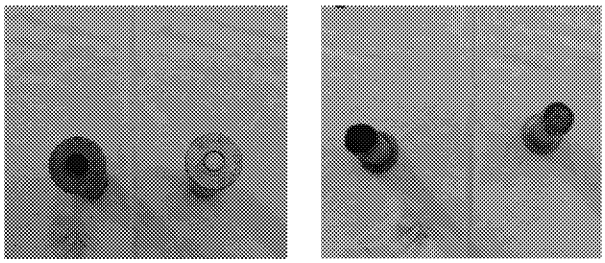
Processed 1390-N285 Mechanical Timed Fuze, cut to validate explosive free



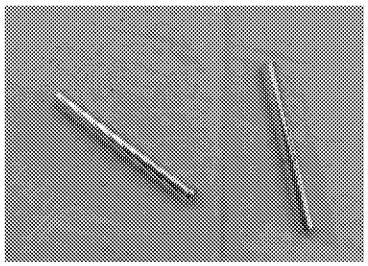
1377-MF29 Impulse Cartridge Before and After Processing



M934 Ignition Element Packaging

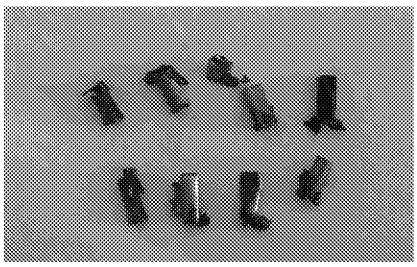


1390-N525 Percussion Primer Before and After Processing



1376-ML68 Detonator Before Processing

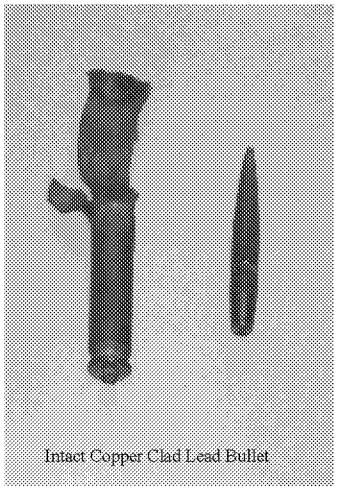
1330-G850 Charge Before Processing



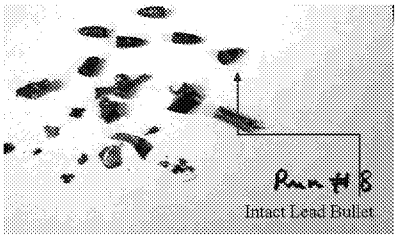
1375-M131 Blasting Cap After Processing

"Decinerated"- Processed Material Condition

CTG. CAL .50 BALL M2 LINKED



CTG. CAL .38 SPEC BALL M41

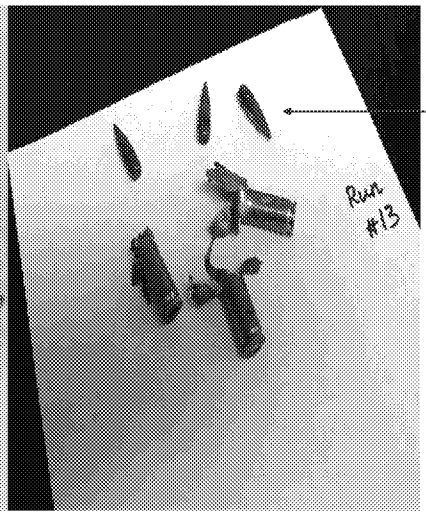


CTG. CAL .22

"Decinerated"- Processed SAA Material Condition

Intact Copper Clad Lead Bullet

CTG. GREN RIFLE 7.62MM M64



CTG. 7.62MM 4 BALL M80/1 TR M62 LINKED