DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY
INSTALLATIONS, ENERGY AND ENVIRONMENT
110 ARMY PENTAGON
WASHINGTON DC 20310-0110

20 MAR 2015

Mr. Carl Edlund
Director, Superfund Division
U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Dear Mr. Edlund:

Enclosed is the report from the technical assistance visit (TAV) you requested in your email of March 5, 2015 regarding an assessment of the condition of Clean Burning Igniters (CBI) and M6 propellant as referenced in Colonel Ronnie D. Stuckey's, Project Manager, Louisiana Military Department (LMD), February 27, 2015 email. The enclosed TAV report provides recommendations for the U.S. Environmental Protection Agency, Region 6's (EPA 6) consideration for implementation to improve the explosives safety posture at Camp Minden.

An Army team conducted the requested TAV at Camp Minden from March 9 to 11, 2015. After discussions with the LMD and representatives from the Louisiana Department of Environmental Quality on March 9, 2015, the TAV team visited five explosive storage magazines and observed storage conditions of the CBI, M6 propellant, wet nitrocellulose (NC), and tritonal located therein. The focus of the team's observations was the CBI's storage and packaging conditions in leaking storage magazines where water was dripping onto CBI packaging and pooling on the magazine floor. The TAV team inspected the storage magazines, took temperature readings, and checked the packaging and condition of CBI and M6 stored within the five structures visited.

As during previous TAV, the team's primary focus was on ensuring recommendations it made for EPA's consideration focused on actions that would reduce or mitigate potential explosive hazards to LMD personnel and public safety.

My point of contact for this matter is Mr. J. C. King, Director for Munitions and Chemical Matters, and Army DDESB Voting Member, phone number (703) 697-5564; email jc.king@us.army.mil.

Sincerely,

Hershell E. Wolfe
Deputy Assistant Secretary of the Army for
Environment, Safety and Occupational Health

Enclosure: As stated.

ENCLOSURE

Department of Army

Report

of

Explosives Safety Technical Assistance Visit
(March 9 to 11, 2015)

to

Louisiana National Guard's
Camp Minden

Final Report of Explosives Safety Technical Assistance Visit to Camp Minden
(March 9 to 11, 2015)

1. Background

a. On March 5, 2015, the Director, Superfund Division, U.S. Environmental Protection Agency (EPA) Region 6 (EPA 6), requested by email (Enclosure {Encl}1) the Army send a technical expert, as soon as possible, to observe the condition of Clean Burning Igniters (CBI) and M-6 propellant referenced in Colonel Ronnie D. Stuckey's February 27, 2015 email (Encl 2).

b. EPA requested the Army expert provide explosive safety advice to EPA and the Louisiana Military Department (LMD) regarding safety for continued storage or disposition of the material. EPA provided pictures (Encl 2, Attachment) that illustrated the material's current condition, including the packaging condition and current storage configuration.

c. On March 5, 2015, the Assistant Secretary of the Army for Installations, Energy and the Environment authorized the Office of the Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health to provide the support EPA requested.

d. During March 9 to 11, 2015, the Defense Ammunition Center (DAC) and U.S. Army Technical Center for Explosives Safety (USATCES) conducted an Ammunition Logistics and Explosives Safety Technical Assistance Visit (TAV) to Camp Minden. The team consisted of:

(1) Mr. Windell R. Mitchell, Supervisory Quality Assurance Specialist (Ammunition Surveillance) (QASAS); and

(2) Mr. James P. Lane, Logistics Management Specialist.

e. During the TAV, the TAV team met on the days indicated with the below people:

(1) COL Stuckey, LMD's Coordinator for LMD's Explosives Destruction Effort (March 9 and 10, 2015);

(2) Ms. Linda Mahon, LMD's Explosives Safety Officer (March 9, 2015);

(3) Mr. Kevin O'Brien and Mr. Larry Baldwin, Louisiana Department of Environmental Quality (LDEQ) (March 9, 2015);

(4) Mr. Carl Edlund, Director, EPA 6's Superfund Division (March 10, 2015);

(5) Mr. Doug Maddox, EPA's Federal Facilities Restoration and Reuse Office (March 10, 2015);

(6) Mr. Sam Coleman, EPA 6's Deputy, Regional Supervisor (March 10, 2015); and

(7) Mr. Greg Fife, EPA 6's On-Scene Coordinator (March 10, 2015).

f. As a result of the March 10, 2015 meeting with the aforementioned EPA representatives, during which the TAV team discussed its preliminary observations, EPA developed a list of questions regarding the CBI and other propellant material present in the Camp Minden storage area. These questions and the Army's responses are set forth in Encl 3.

2. Executive Summary

a. After discussions with LMD and LDEQ on March 9, 2015, the TAV team visited five explosive storage magazines and observed storage conditions of the CBI, M6 propellant, wet nitrocellulose (NC), and tritonal located therein. The focus of the team's observations was the CBI's storage and packaging conditions in leaking storage magazines where water was dripping onto CBI packaging and pooling on the magazine floor. The TAV team inspected the storage magazines, took temperature readings, and checked the packaging and condition of CBI and M6 stored within the five structures visited.

b. The TAV team:

(1) Inspected magazine vents and interior, material packaging and took temperature readings using a Southwire 31030S Non-contact Infrared (IR) Thermometer. The IR Thermometer's emmissivity setting were adjusted for concrete, timber (wood) and paper at 0.94, 0.90, and 0.90, respectively. at similar points within each magazine and on wood pallets and the outer packaging of CBI and M6 propellant stored within each structure. Direct temperature measurements were not taken of CBI or M6.

(2) Took temperature readings:

(a) In Fahrenheit (F) to determine whether the readings that detected temperatures significantly above ambient that may be an indicator of advanced decomposition. Similar reading and observations were taken in magazines that did not contain CBI for comparison with observations made within magazines where CBI was stored.

(b) At the left and right side (L/R) of headwall; center of rear wall; on wood pallets at either front/center/rear (F/C/R) of magazine (as accessible); and the outer pack surface (box, drum, triwall cardboard).

c. The precise effect of high moisture and humidity storage conditions on decomposition rate of the CBI and M6 within leaking structures cannot be determined from the data the TAV team was able to collect. Other methods of temperature sampling, such as core sampling of accessible packaged material via temperature probe, were not considered given the risks for accidental ignition from mechanical friction or crushing of propellant pellets. Collection of data needed to make a definitive assessment of the condition of the CBI would require an extensive effort that includes removing material from storage and conducting a comprehensive assessment in a surveillance workshop.

d. Conditions the TAV team observed with regard to the CBI, and to a lesser degree the M6, during the TAV can accelerate propellant decomposition. These conditions include unsealed (not airtight) packaging; exposure to ambient moisture and humidity; previous outside storage conditions; and continued retention of bulk propellant of unknown LOTS in these storage conditions.

e. Although there remains uncertainty with regard the actual condition of the CBI at Camp Minden, the TAV team recommends EPA consider implementing an emergency destruction of the wet (NC) in magazine 2471.

f. The TAV team also recommends EPA consider implementing the destruction of the remaining CBI as soon as possible.

g. The TAV team also observed storage structure deficiencies (e.g., vents closed, fusible links missing) that EPA and LMD should consider inspecting and having repaired as soon as possible (see Observations by Magazine (MAG)). These deficiencies could increase the ambient humidity within a magazine and increase the condensation experienced within the storage magazine. As previously indicated, moisture potentially contributes to accelerated propellant decomposition.

Observations and Recommendations:

Observations:

- **Tabulated Data.** The ambient outside temperature (temp) was 52 degrees F.

MAG	Contents	Temp Headwall L/R	Temp Wood Pallet F/C/R	Temp Rear wall	Temp Box/Triwall F/C/R	TempDrum F/C/R
2419	CBI (Moldy box)	45.6/45.5	42.2/-/-	44.4	-/40.2/39	
2432	CBI (dry box)	47.1/47.3	-/47.1,46.9/-	48.2	-/45.8, 46.7/47.1, 46.9	
2471	CBI (dry box), M6 (dry, triwall, drum) NC (wetted bag)	44.4/44.7	-/46.4,46.5/-	48.5	45.5/47.6, 47.1/-	44.9/-/-
2318	M6 drums dry /Tritonal, dry drums,	45.1/46.2	-/44, 44.2/-	-	-	44.4, 44.2/-/-
2310	M6, drums, triwalls, wet packs	46.7/46.5	-	50.1	49.1, 49.6 (M6Triwall dry), 48.3 (wet triwall)/-/-	48/-/-

- Packaging configurations.

  - CBI – loose flakes inside pink-colored (presumed electro-stat, not verified) clear plastic bag that was unsealed, and inside a cardboard box. The cardboard boxes were palletized.
  - M6 – loose pellets:

    - ✓ Inside a fiber drum, palletized; and
    - ✓ In an 800-lb plastic hopper sack that was unsealed and inside a triwall cardboard box, with or without triwall lid. The hopper sacks were palletized.

  - Tritonal – inside a fiber drum.

Observations by Magazine (MAG) (see pictures at Encl 4):

- MAG 2419:

  - Concrete arch earth-covered magazine (ECM) with front vent open, rear vent rusted closed, and support chain and fusible link missing;
  - Interior of arch treated with some type of spray-on liner material;
  - Water condensation present and dripping on magazine's contents and standing in pools on floor;
  - Contents palletized, double-stacked;
  - Boxes were wet and moldy with loose CBI on boxes; and
  - Evidence of ruptured or collapsed boxes present.
  - General smell encountered was moldy cardboard, with no normal propellant (solvent) or acidic smell.
  - One box was opened to determine inner packaging configuration. A pink-colored liner bag was present, but was not sealed. There was no visible moisture within liner bag. There was no LOT number or specific identification on boxes.

- MAG 2232:

  - Concrete arch ECM with dry interior;
  - Front and rear vent open, rear vent had been replaced with a recent design with interior flue;
  - Contents were palletized, double-stacked in good order;
  - Small quantities of spilled CBI on boxes, but no evidence of collapsed or ruptured boxes; and
  - General smell encountered was normal magazine smell.
  - One lid was removed from a box. A pink-colored liner bag was present and was not sealed. There was no visible moisture inside bag.

- MAG 2471:

  - Corrugated, galvanized steel arch ECM with dry interior;
  - Front and rear vents open;
  - No evidence of moisture, loose propellant, or collapsed or ruptured packaging.
  - NC was in a pink-colored bag, marked ‘NITROCELLULOSE,’ containing solid white sheet material and visible milky-white liquid.

- MAG 2318:

  - Concrete arch ECM with dry interior, front and rear vents open.
  - Interior was stuffed with M6 drums and tritonal drums.
  - Interior rear and sides of magazine were not accessible.
  - Some of the tritonal drums were crushed.
  - Strong propellant odor (solvent) present.
  -

- MAG 2310:

  - Concrete arch ECM, with crack in arch reaching approximately halfway across with water dripping on content;
  - Front and rear vents open;
  - Magazine contents: M6 in triwalls and drums;
  - Approximately five triwall pallets of M6 were wet on top.
  - A triwall top was lifted to examine the 800-lb bag. The bag appeared and felt dry. General smell present was that of normal propellant.

General Observations:

- CBI and M6 in unsealed packages are continually exposed to ambient humidity.
- Several of the M6 triwall pallets had water marks from exposure to standing liquid water on the package during the time period the material was stored outside.
- There were no gross indications, from the limited data collected, of unusually high or low temperatures.
- The precise effect of high moisture- and humidity-storage conditions on decomposition rate of the CBI and M6 cannot be measured from the data collected.
- Conditions encountered during this visit that can accelerate propellant decomposition include:

  - Unsealed (not airtight) packaging;
  - Exposure to ambient moisture and humidity;
  - Previous outside storage conditions, and continued retention of bulk propellant in these storage conditions.

Recommendations - EPA 6 and LMD should consider:

- There is ongoing accelerated decomposition; therefore an increasing risk of a catastrophic auto-ignition for all CBI and M6 stored in unsealed containers.
- Absent significant changes in the current storage conditions, the cumulative probability of a catastrophic event will increase to a point where personnel within the fragmentation arcs of storage magazines may be in imminent danger.
- Repairing the rear vent on MAG 2419 to allow air flow through the magazine. Doing so may reduce or alleviate condensation.
- Covering the top of stacks in MAG 2419 with visquine or another impermeable material to prevent further wetting of boxes until dripping from condensation stops. Once the condensation stops or dries up, the cover should be removed to allow the wet material to dry out. Leaving the shroud in place will slow the drying process.
- Re-warehousing the content of the MAG 2419 to a dry magazine, if condensation and dripping cannot be stopped.
- Destroying the wet nitrocellulose in MAG 2471 as soon as possible – as an emergency destruction.
- Moving the material underneath the cracked arch in magazine 2310 to a dry portion of the magazine as soon as possible. If the material cannot be moved expeditiously, shroud the material as described above.
- Destroying safely the CBI and M6 - given the accelerated propellant decomposition and unknown LOT identity - at Camp Minden as soon as possible in minimum time with minimum handling.
- Informing personnel who work on Camp Minden, particularly those who routinely work within the fragmentation arcs of magazines storing CBI and M6 of the present and increasing risk of a catastrophic auto-ignition event.
- Inform the public of the present and increasing risk of catastrophic auto-ignition event.
- Designing and installing porous (e.g., expanded metal) or blow-out doors (door would fail or blow out in the event of a nominal over-pressure condition inside the magazine) on each CBI and M6 storage magazines if the material is not destroyed in near-term (12 to 18 months). Doing so would serve to vent the explosion in the event of a catastrophic auto-ignition and reduce the fragmentation and blast effect of the event; however, such doors would compromise physical security. Vulnerability should be assessed, with security-compensatory measures implemented or vulnerability risks accepted.
- Preparing firefighting, law enforcement, mass casualty, and evacuation plans in advance. In each plan fragmentation arcs should limit the actions taken and number of people committed inside an explosive safety quantity distance arcs.

From: Edlund, Carl
Sent: Thursday, March 05, 2015 1:36 PM
To: 'james.c.king4.civ@mail.mi'
Cc: 'ronnie.d.stuckey.nfg@mail.mil'; Gray, David; Crossland, Ronnie; Webster, Susan; Doug Maddox; Pam Phillips
Subject: FW: Clean burning Igniter (CBI) (UNCLASSIFIED)

Dear Mr. King:

The purpose of this memo is to request you to send a technical expert as soon as possible to observe the condition of CBI and M-6 propellant referenced in Colonel Stuckey's February 27, 2015 email provided below. We ask that the expert provide explosive safety advice to EPA and LMD regarding safety for continued storage or disposition of the material. I have included pictures which provide information on known condition, packaging condition, and current storage configuration..

Regards

Carl E. Edlund P.E
Director, Superfund Division
EPA Region 6
214-665-6701 [office]
214.789.1879 [cell]

ENCLOSURE 1

From: "Stuckey, Ronnie D NFG NG LAARNG (US)" <ronnie.d.stuckey.nfg@mail.mil>
To: "King, James C CIV USARMY HQDA ASA IEE (US)" <james.c.king4.civ@mail.mil>
Cc: "Fife, Greg" <fife.greg@epa.gov>
Subject: Clean burning Igniter (CBI) (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

JC,

While verifying CBI packaging configuration today, we discovered one magazine (#2419) that has significant condensation. I thought it was leaking at first, but upon further investigation it looks like heavy condensation from inside. Water is actually dripping from the roof. As you can see from the attached photos many boxes of CBI are extremely wet and a majority of the boxes have mold growing on the outside. Some of the boxes appear to be swelling. We did not detect any unusual odor but need advice from you and your staff on what to do regarding this situation

This magazine has approximately 121,000 lbs of CBI.

Another magazine (#2310) that contains approx. 124,000 lbs of M6 Propellant, has a leak in the roof and water has dripped onto at least five 880 lb Super sacks. Once again is this something we should be concerned about?

CLASSIFICATION: UNCLASSIFIED

ENCLOSURE 2

ENCLOSURE 2, ATTACHMENT

Enclosure 3: Responses to U.S Environmental Protection Agency Questions

Question (Q) 1: Community and workers, are they in immediate danger?

Once CBI and M6 material at Camp Minden was moved to storage in storage magazines based on distributed net explosives weights (NEW), the quantity of explosives in each magazine was estimated to develop collective explosives safety quantity distance (ESQD) for each storage location (see attachment). These ESQD do not extend beyond Camp Minden's installation boundaries. Therefore, in the case of a catastrophic event, fragmentation blast damage beyond the installation's boundary is expected to be negligible. There is potential for broken windows, but without projection of glass shards inward, and for cosmetic damage. However, the risk of significant structural damage to buildings or overpressure injury to humans located outside the installation's boundary appears minimal. These estimates, which are subject to uncertainty based upon a variety of factors, do not eliminate the possibility of anomalous significant adverse events extending beyond the installation boundary.

People working within Camp Minden's installation boundary that are within the ESQD may be at risk from a catastrophic auto-ignition event. Specific consequence depends on distance from such an event. In a risk matrix, the possibility for an auto-ignition event at any point in time is not quantifiable. In such an event, the magazine involved would be destroyed and the consequences within the installation's boundaries, to both individuals and property, may be catastrophic.

Q2: CBI with wet moldy packaging is it a concern? How long have we got?

The mold, which is using the packaging as a nutrient source, is not of itself a concern. However, the mold is an indication of prevalent moisture which is known to accelerate propellant decomposition

CBI is 98% nitrocellulose and 1.5% diphenylamine (stabilizer). Nitrocellulose is slightly hygroscopic (absorbs water) and water causes the nitrocellulose to deteriorate faster. Other factors being equal, moisture-inducted deterioration of nitrocellulose may raise the risk of an inadvertent auto-ignition. Given the cardboard boxes are wet and not water tight, EPA should consider the fact that there is most likely an elevated risk of auto-ignition of the damp CBI. An auto-ignition (fire) inside a magazine would quickly involve everything stored within the magazine. The amount of time remaining before an auto-ignition could occur is not known.

Q3: If the CBI and M6 in this condition were found in an Army Magazine, what actions would the Army take? In what timeframe and priority?

Army policy is to condemn such material, and to destroy it, in most cases, by open burning within 60 days. This destruction operation would be given priority over other destruction activities. Given the uncertainty of the state of deterioration of CBI and M6 at Camp Minden, EPA should consider conducting immediate disposal operations on a continuous basis during daylight hours of those propellant materials contained in compromised packaging that has gotten wet or been in high humidity or wet magazines.

Q4: In reference to moldy wet packaging CBI, what are specific recommendations for the next 30 to 60 days? In regard to storage monitoring? In regard to emergency destruction?

EPA should consider destroying CBI and M6 propellant in compromised packaging that has gotten wet or been in high humidity or wet magazines immediately. LOT identity for this material is unknown. Given the higher nitrocellulose content of CBI, EPA should consider destroying the CBI first. Additionally, much of this material has already experienced an abnormal storage environment that most likely increased its rate of decomposition.

In the interim, EPA should consider:

- Blocking the magazine doors open and retrofitting a porous or “blow out” door. This would allow significant venting of the magazine in an auto-ignition event.
- Increasing visual storage monitoring of each storage location to once per week.
- Installing thermometers at each location and monitor for any change in temperature away from the average ambient temperature in all locations.

Q5: What storage monitoring metrics, in terms of temperature, smell or other, would trigger an emergency action.

There is no empirical temperature data on stored propellant that has undergone an autocatalytic ignition event. The presence of acrid NOx fumes is an indication that the propellant has exhausted available stabilizer. Typically propellant will appear to become dormant after this, but is continuing to decompose and the process will eventually become exponential.

Q6. Can the Army identify the risk indicators throughout the destruction process?

For every propellant handling process, the presence of acrid fumes, smoke, or a measurable temperature rise above ambient conditions would be indicators of an imminent auto-ignition. However, the absence of acrid fumes, smoke, or a measurable temperature rise is no guarantee that auto-ignition is not imminent.

Inadvertent ignition during handling and transportation from friction, crushing, or static discharge are inherent risks and must be mitigated or managed.

Q7. In reference to the entire quantity of CBI and M6 at Minden, what are specific recommendations for the next 30 to 60 days?

EPA should consider:

- Minimizing the risk of an auto-ignition through the prompt destruction of M6 and CBI, with destruction of CBI given priority.

- Developing procedures to dispose of the CBI with minimal handling (e.g., do not break down the pallets)
- Retrofiting each magazine storing CBI or M6 with porous or “blow-out” doors to allow venting in an auto-ignition event.

Q8: In reference to the August 2015 predictive date for potential auto-ignition event at Camp Minden, any destruction timeline put in place now will not be complete prior to August 2015. What are recommended priorities in regard to that? What are actions in case of a catastrophic event?

The Army’s technical assessment was that, given the uncertainty of state of deterioration of stabilizers in the M6 and the loss of LOT identity, the risk of an explosives event increased significantly after 18 months (circa August 2015). A definitive predictive date for an auto-ignition event would have no validity and should not be used as a planning tool.

EPA should consider giving priority for the destruction of material that has compromised packaging or storage conditions. In the case of a catastrophic event, there likely will be inadequate time for those within the ESQD (see attachment) to react as rapidly and effectively as desired. Those outside the ESQD radius, particularly those within the installations boundaries, should seek added protection (i.e., shelter) from the effects of an incident.

EPA and LMD should consider preparing notifications and public statements in advance of a potential incident. Additionally, EPA and LMD should consider advance planning and preparation for an incident response. Such planning and preparation should define incident control responsibilities, including control of first responders (e.g., law enforcement, medical, firefighting); conducting a mass exercise; and planning for other contingencies (e.g., evacuation, if determined necessary. Police control should be advised to prohibit access within the ESQD arcs. Personnel committed inside the ESQD arcs, including medical and firefighting personnel and equipment should be limited to the minimum essential. Generally, fires that encumber military munitions should be left to burn, focusing firefighting from outside ESQD arcs on preventing the spread of fires to other storage structures. Inform the public and personnel that work at Camp Minden of the present and increasing risk of a catastrophic auto-ignition event.

Q9: What are recommendation for contractor expertise and experience?

Recommend EPA consider a company’s history of successfully handling and destroying large quantities of energetic materials safely; and the company’s possession of required licenses. Additionally, we recommend EPA consider the qualifications and training of company personnel to be on site. Relevant factors for consideration might include the following:

- Whether local workforce personnel (management, technical staff, and supervision down to the crew leader level) have extensive explosives safety expertise and experience in handling and destroying energetic materials (e.g., large quantities of propellant).
- Whether laborers or crew member have adequate experience in handling or managing explosives. This will be beneficial to the safety of operations. All

personnel should be able to rapidly progress through a local training program to ensure personnel competence and reliability.
- Whether equipment operators have been previously licensed, and have a demonstrated track record of experience and competence.

EPA should also consider requiring:

- Mandatory drug testing for the entire workforce.
- Some form of security checks to ensure personnel hired to support operations are allowed access to ammunition and explosives
- Operational procedures and engineering controls emphasize prevention of static spark generation and careful handling of CBI and M6 in movement, transportation, and destruction.

Q10: Is there releasable data on the Army Super Critical Water Oxidation (SCWO) program tests? Was the program abandoned in Korea? If so why?

The Army is currently using a SCWO for the destruction of pink water (explosive-contaminated water) in the Korea demilitarization facility. The SCWO developed by General Atomics and in use in Korea, as currently designed, has limited throughput. The SCWO in Korea is still operating and is planned to continue operating until at least December 2016. This SCWO is a 1.2 gpm unit that is at least 10 years old that is operated by a Korean crew. It was recently repaired to correct erosion in the tubing. The system operates with very high temperatures and high pressures.

As indicated below (see Hydrolysis), M6 would need a preparation step such as grinding or alkaline hydrolysis to prepare an aqueous waste stream. The partial iSCWO that was moved to McAlester Army Ammunition Plant from Camp Minden is not close to complete, but may be available if needed.

The Army had tentative plans for an iSCWO ("improved" SCWO) to demilitarize propellant, but those plans were overcome by costs to develop the capability, costs to operate per ton, and environmental permitting issues. The system operates at extremely high temperatures and pressures. The Army is not aware of operations that use an SCWO for destruction of propellant; although some testing has been conducted by General Atomics with propellant.

Q11. Is there data on CBI and M6 constituents? Toxicity of constituents? BTU value? Inert components?

Hazardous Component Data Sheets should be publicly available for all constituents. Additionally, a daughter product of the stabilizer, N-nitroso-diphenylamine, may be toxic.

M6 and CBI Munitions Constituents

Composition and Properties	M6	CBI
Nitrocellulous %	87.00	98.0
% Nitrogen in NC	13.15	-
Dinitrotoluene, %	10.00	-
Dibutylphthalate, %	3.00	-
Diphenylamine, %	1.00	1.50 +/- 1.0
Ethyl alcohol (residual), %	0.90	-
Water (residual), %	0.50	-
Composition and Properties	**M6**	**CBI**
Potassium Nitrate, %	-	0.1 max
Graphite glaze, %	-	0.2 added
Isocholoric flame temp, T_v, K	2,570	-
Force, ft-lb/lbx10^{-3}, F	317	-
Unoxidized carbon, %	6.8	-
Combustibles, %	62.4	-
Heat of explosion, cal/g	758	-
Gas volume, moles/g	0.04432	-
Ratio of specific heat	1.2543	-
Covolume, in. ^{3}/lb	29.92	-
Density, g/cm^3	1.58	-

Q12: Request the Army prepare a fact sheet describing the difference between CBI, M6, and toxic chemical weapons.

Fact sheets on chemical weapons are open source documents available on the internet. These documents show that CBI and M6 are substantially different from and are not chemical weapons.

There are significant differences in the effects of propellant burning and toxic chemical munitions. Propellant ignition produces considerable amounts of intense heat and gas. Propellant was not designed to be a causality producing. Toxic chemical munitions are of two types: blister agents (i.e., that produce severe chemical burns [not thermal burns]) on the skin, eyes and lungs) and nerve agents (that disrupt the nervous system preventing breathing). Toxic chemical munitions are not an issue at Camp Minden.

Q13: Has the Army ever destroyed a magazine of hazardous propellant in place? When the propellant becomes too hazardous to move is it advisable to deliberately ignite a magazine full of propellant? Is there a maximum quantity not to exceed if the material was deliberately ignited in the magazine? What are the risks of such an action?

Army military munitions surveillance policies and procedures preclude a requirement for in-situ destruction of such material.

DoD is not in a position to provide an advisable quantity of propellant that would be allowable or safe for an intentional ignition within a storage area. An action of this nature is imprudent.

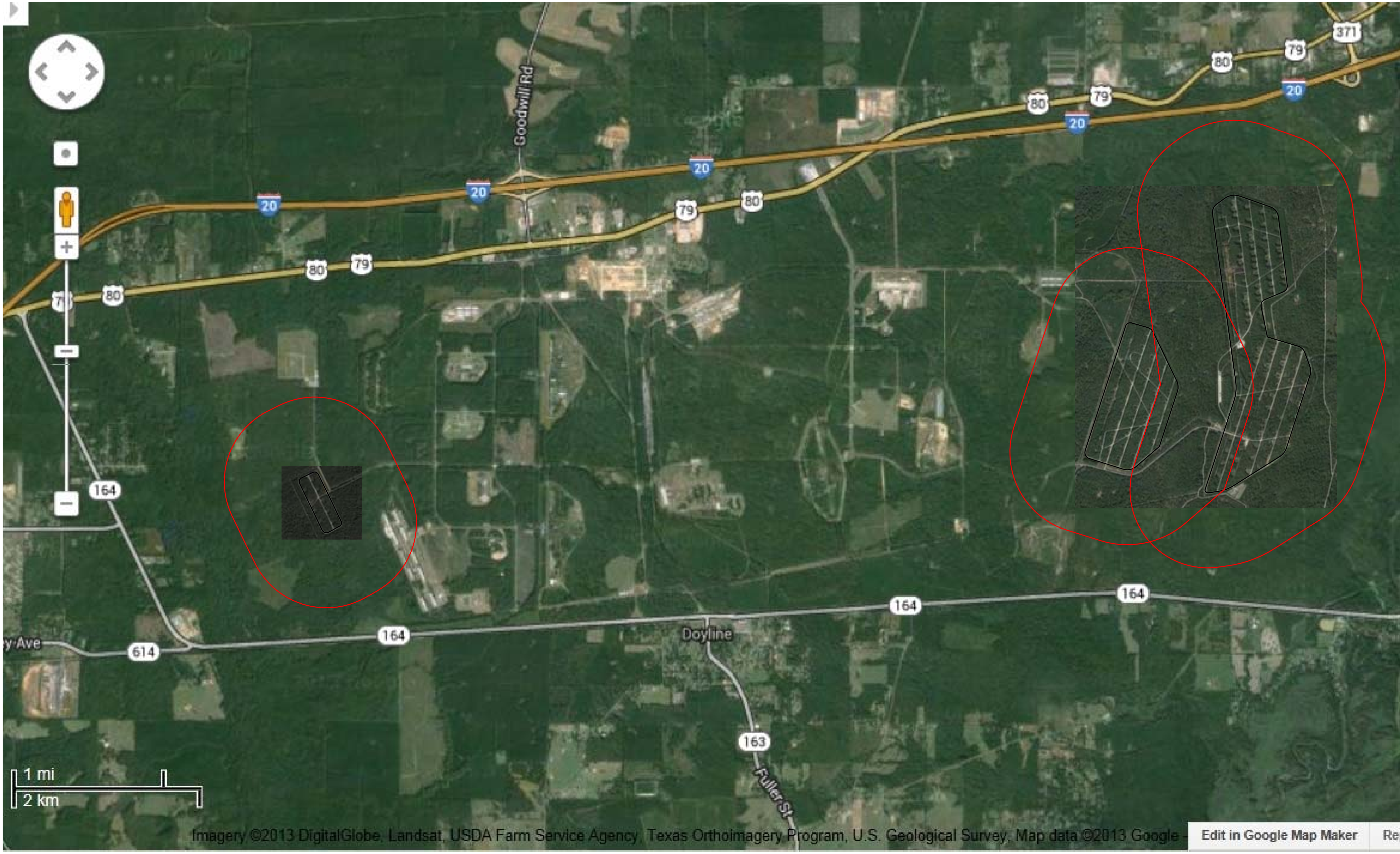
The DDESB has established a method for calculating ESQD arcs associated with the NEW of stored military munitions (ammunition and explosives) as a function of hazard class and storage structure. This data is not intended for use for determining the blast and fragmentation effects of an in-situ detonation, but could provide some general insight as to the expected radius of impact. Risks associated with use of the data for such purpose include miscalculation due to unknown material, incorrect calculation of the NEW, indeterminate blast propagation and fragmentation, and wide dispersion of ignited material.

Ignition of a magazine of propellant might be a prudent course of action if auto-ignition was imminent and not otherwise preventable, when the risk of movement of stored material is determined to be unacceptable. An intentional propellant burn would allow for people to be removed to a safe distance prior to ignition. It should be noted that when propellant burns it produces a large volume of intense heat and gas. Should an auto-ignition occur within a concrete ECM full of propellant, the propellant will produce a significant amount of gas, which will then push against the magazine structure. The magazine will fail at the headwall and across the top of the arch on the interior. Very large chunks of concrete (with rebar) will be thrown large distances (probably more than 2000 ft). ECMs are designed to resist an external detonation, not to contain an internal detonation. To reduce the effects of such, the igloo doors should be opened prior to and during the ignition. However, precautions should be taken to preclude a fire spreading given the high heat generated by burning propellant.

Q14. Are there any actions to mitigate (reduce) effects of a spontaneous auto-ignition event?

Recommend EPA consider implementation of the steps described below to mitigate the potential consequences of an auto-ignition of M6:

- Maintain fire breaks and remove dry vegetation.
- Keep combustible material (trees, wooden structures) in the vicinity wetted.
- Minimize the amount of propellant stored in any single location.
- Employ remote operations whenever possible.
- Reduce potential impact of fragmentation through the positioning of HESCO barriers.
- Design and install porous (e.g., expanded metal) or blow-out doors (door would fail or blow out with a nominal over pressure inside the magazine) on all CBI and M6 storage magazines. The doors would serve to vent the explosion in a catastrophic auto-ignition event and reduce the fragmentation and blast effect of the event. (Notes: (a) hot-work, should not be involved in installing the doors, instead the porous doors should just be placed within the magazine door's opening; and (b) such doors would compromise physical security of the magazines. As such, vulnerability must be assessed, with security compensatory measures implemented or the vulnerability risks accepted.



Goodwill Rd
20
80
79
371
164
614
163
Doyline
Fuller St
1 mi
2 km
Imagery ©2013 DigitalGlobe, Landsat, USDA Farm Service Agency, Texas Orthoimagery Program, U.S. Geological Survey, Map data ©2013 Google
Edit in Google Map Maker

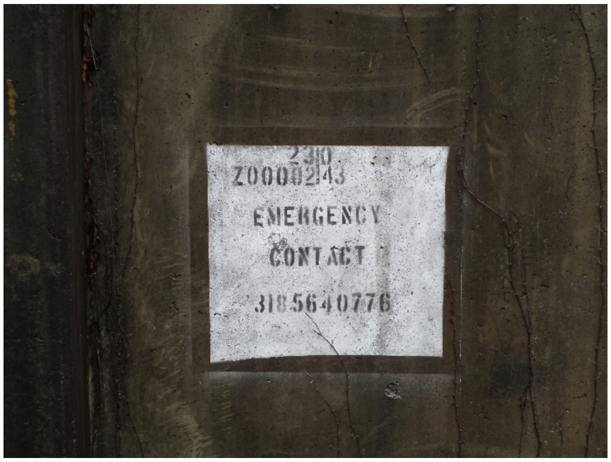
ATTACHMENT

Attachment: Pictures of Storage Magazine Storing Clean Burning Igniters

Magazine 2419

Magazine 2432

Magazine 2310



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