

Department of Army

Report

of

**Explosives Safety Assistance Visit
(1 to 5 December 2014)**

to

**Louisiana National Guard's
Camp Minden**

February 23, 2015

ENCLOSURE

Final Report of Explosives Safety Assistance Visit to Camp Minden (1 to 5 December 2014)

1. Background

a. On 2 July 2014, Major General Glenn H. Curtis, The Adjutant General, Louisiana National Guard requested the Army provide a Technical Assistance Visit (TAV) within the next 30 days to Camp Minden, Louisiana, to assess the potential short and long term hazards associated with the continued storage of M6 propellant (approximately 15 million pounds) and other energetic material (certain ignitable material), and provide recommendations relative to the risk of explosion presented by the current storage configuration. The Environmental Protection Agency (EPA) made a similar request on June 24, 2014.

b. On 29 September 2014, the Secretary of the Army authorized the Assistant Secretary of the Army for Installation, Energy and the Environment (ASA (IE&E)), to provide the technical assistance and advice required to address the explosives safety concerns potentially posed by certain ignitable material at Camp Minden, Louisiana. The Secretary of the Army's authorization allowed the Army's technical assistance to: (1) include on-site visits to assess the condition of the material; (2) provide advice on how to establish a stability monitoring program; (3) provide recommendations to ensure the explosives safety of operations; (4) include technical reviews of plans; and (5) provide advice related to the storage and final disposition of this material. The Secretary also allowed the ASA (IE&E) to request other Army organizations to assist in providing this support and re-delegate this authority, as determined necessary.

c. The Army's provision of support was delayed until completion of negotiations and agreement on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Settlement Agreement, the subject of which was this ignitable material.

d. During 1 to 4 December 2014, a team, under the direction of Mr. J. C. King, Director for Munitions and Chemical Matters, Office of the Deputy Assistant Secretary of the Army for Environment, Safety; and Dr. Upton Shimp, Director, Defense Ammunition Center (DAC) and U.S. Army Technical Center for Explosives Safety (USATCES), conducted the requested TAV. The team consisted of:

- Mr. J. C. King
- Dr. Upton Shimp, DAC/USATCES
- Mr. Paul Cummins, USATCES
- Mr. Ray Mitchell, DAC
- Dr. Robert Kirgan, U.S. Army Environmental Command

2. Executive Summary

a. As requested, the TAV team observed the condition of the material as currently stored within several magazines; visited both the primary proposed demolition (open burn) area and a secondary or alternate burn area; observed a test burn of approximately 1,200 pounds of M6, with air monitoring; and reviewed and discussed EPA's and the Louisiana Military Department's (LMD) proposed approach for the conduct of operations. The TAV team also reviewed the draft Statement of Work (SOW) that LMD would release seeking proposals for the work required.

b. The TAV team provided advisory input to LMD and EPA pertaining to the lack of a propellant stability monitoring program for the M6 in storage at Camp Minden with LMD and EPA 6. The current status of the propellant's stability is not known; therefore, determination of the risk of an auto ignition is not possible. Analysis of the propellant LOTS present at Camp Minden in April 2013 indicated a propellant stability program should be established as soon as possible. Given the information available at that time, the Army believed the loss of knowledge about the propellant's stability was not immediately problematic, but after 18 to 24 months the risk posed would increase significantly. TAV teams recognized that the timeline over which the risk would become significant was uncertain given the manner in which this propellant was handled; packaged, including a loss of LOT identity; and stored, including outside storage with exposure to weather. The TAV team agreed with EPA 6 that a propellant stability monitoring program would at best provide only a relative idea of the propellant's stability. This was truer for the 800-lbs bag configurations than the other configurations. Given the packaging configurations of the M6 (800-lb bags, 110-lb drums, and 50-lb cardboard boxes), the TAV team discussed the need to give priority, in order, to the destruction of the 800-lb bags, then the 110-lb drums, and then the boxes. The TAV team believes it may be possible to determine, with confidence, the stability of propellant in the 50-lb boxes, possibly allowing some of this propellant to be reclassified to reusable product. Doing so could be challenging, but it could reduce the quantity of M6 that needs to be burned. Although it may be possible to test the propellant concurrently with other required actions, the process could not be initiated until after the other packaging configurations are removed from storage. The TAV team cautioned about unnecessary handling of the packaged propellant, regardless of configuration and recommended the propellant only be handled once (i.e., moved directly from storage to final disposition and limiting re-warehousing within a storage structure to that absolutely required for safety).

c. The TAV team cautioned against the aggressive nature of the proposed schedule for the destruction of the M6 propellant, emphasizing that open burning of propellant is a hazardous operation. As such, an operation of this nature with multiple burn pans and high quantities of propellants requires a comprehensive explosives safety management program (ESMP), careful orchestration of required activities, and careful oversight.

Observations and Recommendations

Disposition of M6 Propellant and other Explosives

Observations

- The aggressive timeline established by EPA 6 for the demilitarization of M6 and CBI may add unnecessary risk to an already hazardous operation.
- LMD and EPA Region 6's (EPA 6) On-Scene Coordinator (OSC) appeared to understand the:
 - Explosives hazards involved in the proposed disposal activity;
 - Measures required to manage the safe disposal of M6 and CBI at Camp Minden;
 - Actions needed to mitigate risk to workers and the public; and
 - Environmental monitoring requirements needed to help ensure public safety.
- As written, the SOW required adherence to DoDM 4145.26, Contractor Safety Manual (see below), with burn pan spacing of 150 ft.

"C15.9.8. Parallel beds of explosives prepared for burning shall be separated by not less than 150 ft [46 m]. Care shall be taken to prevent material igniting from smoldering residue or from heat retained in the ground from previous burning operations. Unless a burned-over plot has been saturated with water and passed a safety inspection, 24 hours shall elapse before the next burning."

Recommendations - LMD and EPA 6 should consider:

- Allowing for additional time for the disposal of M6, but ensuring operations were completed as quickly and safely as reasonably possible to reduce the potential for auto ignition of propellant for which the stability is unknown.
- Ensuring the selected contractor provide and implement a comprehensive explosives safety management program (ESMP) for each of the activities required to dispose of the propellant and CMI.
- Reviewing the personnel qualifications required for operating personnel contained in the SOW.
- Changing the 150-ft distance requirements of DoDM 4145.26 that were established for burns of mixed explosives material and are probably excessive for burns of propellant only. (An Army activity that is permitted for open burn of propellants, with a DDESB-approved explosives safety site plan uses a 50-ft spacing for propellant-only burns.)

Propellant Burning Operations

Observations

- The proposed burning ground was a satisfactory location for use as a burning ground; could accommodate placement of burn pans, possibly as many as 40. The number of pans that would fit would be dependent on the pans' size and the separation distance required. The size of the pans should allow the propellant to be spread out to a depth of no more than 3 inches.
- An alternate or secondary burning ground, although significantly smaller, was a satisfactory location for use as a burning ground. This site, which is further away from the installations border and populated areas than the primary site, could accommodate placement of burn pans, possibly as many as 10. The number of pans would be dependent on their size and the separation distance required. The size of the pans should allow the propellant to be spread to a depth of no more than 3 inches.
- The proposed burning ground site and the alternate burn ground sites are located in areas that should comply with DoD explosives safety quantity-distance requirements.
- The alternate site is located very near storage structures storing significant quantities of propellant. Use of this area, concurrently with the primary burning grounds would:
 - Reduce, significantly, the distance required to transport propellant, particularly the 800 lbs bags, stored near this site to the primary burning ground.
 - Allow the net explosives weight (NEW) of the total quantity of propellant in storage to be quickly and safely reduced.
 - Allow for the site's continued use, if determined necessary, to continue to burn propellant stored at the other side of the installation.
- The test burn of 1,200 pounds was successfully executed.
- The video of the burn showed propellant grain kick out, and post-burn examination of the burn area confirmed propellant kick out to approximately 10 ft.
- The smoke plume from the burn was not observed because there was not a clear line-of-sight from the observation point.
- The monitoring instrument used was pre-checked; however, the results were not available prior to the team's departure.
- The 800-lb bag packaging has a releasable hopper chute on the bottom and should facilitate direct unloading into the burn pan.

Recommendations - LMD and EPA 6 should consider

- Requiring the contractor to:
 - Provide a comprehensive work plan and standing operating procedures for each operation to be performed.
 - Provide a burn ground layout that:
 - ✓ Provides for the safety of personnel handling (e.g., loading pans) and conducting other operations at the site.
 - ✓ Provides for the required separation of each burn plan.
 - ✓ Allows for transport ingress and egress.
 - Detail the test procedures to be used, including monitoring.
 - Outline the training required for personnel.
 - Outline plans for loading burn plans. Such plans should consider:
 - ✓ Unloading the 800-lb bags of M6 into a burn pan using the bag's hopper chute.
 - ✓ Loading burn pans in a manner that simplifies operations and handling (e.g., one 800-lb bag per pan), without being concerned with the amount actually loaded.
 - Schedule and conduct a pre-operational walkthrough prior to conducting full scale operations.
 - Present a detailed plan for electrical grounding and static discharge control, to include periodic electrical test of the grounding systems.
 - Outline plans for remediating the burn site or sites used upon completion of burning operations.
- Developing operational parameters for burns based on weather conditions, population centers, and plume modeling.
- Requiring the contractor to establish and operate two burn area (one at the primary site and one at the alternate site).

M6 Propellant Storage Configurations

Observations

- Earth-covered storage magazines were dry and structurally sound.
- There was no visual or olfactory indication (i.e., a sour nitrous smell of decomposing propellant would indicate an auto ignition could occur in less than 60 days) of an immediate near-term risk of propellant auto-ignition.
- Storage configurations of packaged M6 propellant varied:
 - 800-lb hopper bags some directly on wooden pallets, with some placed inside a tri-wall cardboard box on a wooden pallet. Some of the tri-wall boxes had been weakened by exposure to weather (rain, heat) when stored outside.
 - 110-lb fiberboard drums
 - 50-lb boxes.

- Damaged packaging and opened containers (bags, drums [crushed], and boxes) were present in most structures visited, with small spills of propellant evident.
- Unstable stacks most likely caused by hasty storage, excessive stack height, and weathered and collapsing packaging were present in most structures.
 - Actions taken by LMD, LA State Police and EPA 6 to mitigate unstable stacks appeared effective
 - Moving the propellant within a storage structure and from storage for its final disposition will be challenging and require development of standing operating procedures to ensure the safety of the crews uploading the propellant.
- Some storage locations have rail only access, with access complicated by brush and overgrowth and by the height of the rail. Other structures are within what appears to be wetland. Movement of propellant-loaded pallets to transport vehicles may require use of movable ramps or construction of a ramp or avenue (path) for access.

Recommendations - LMD and EPA 6 should consider

- Ensuring the contractor develops and implements standing operating procedures for:
 - Handling and moving propellant within storage structures, including addressing loose propellant found on floors and pallets; and to transport vehicles
 - Loading and securing propellant on transport vehicles; and offloading propellant at the burn grounds
- Ensuring the contractor provides increased operator supervision, control, and safety oversight during the handling, movement, and loading of propellant within storage structures.
- Ensuring the contractor plans and procedures that minimize the handling and movement of propellants.
- Providing priority, in order, to the disposal of propellant in 800-lb bags, the 110-lb fiberboard drums, and the 50-lbs boxes.
- Requiring the contractor to remove vegetation from storage site and prepare storage sites, as required, for moving propellant from storage to transport vehicles.

Transportation of Propellant to Burn Areas

Observation

- Storage area roads were gravel.
- Primary transport roads were paved and in good condition.

- Speed limits and marked transportation routes, if followed, can reduce mishap potential.

Recommendation - LMD and EPA 6 should consider

- Establishing speed limits based on hazard analysis of driver experience and road conditions for transportation routes.
- Ensuring that routes used for transporting propellants from storage areas to the burning areas are maintained
- Prohibiting public and limiting authorized traffic on routes used for transporting propellants during transport.

Other Matters

Observation: Potential for M6 propellant auto-ignition will increase over time. Eventually, risk of auto-ignition will increase exponentially. Specific deterioration rate for the M6 at Minden cannot reliably be predicted due to: lost LOT identity; storage in unsealed packaging; and previous exposure to the elements while stored outside.

Recommendation - LMD and EPA 6 should consider

- Proceeding with the expeditious, safe disposal of M6 propellant in the priority stated above.
- Determining whether the stability of boxed or fiberboard drums of propellant can be returned to usable product and re-establishing a propellant stability for such until it is disposed of either by burning or sale.