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August 12, 2002

Ms. Lee Winn
State of New Mexico Environment Department
Hazardous Waste Bureau
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Santa Fe, New Mexico 87505-6303

Reference: Work Assignment No. 06110.040; State of New Mexico Environment Department, Santa Fe, New Mexico; General Permit Support Contract; Los Alamos National Laboratories NOD Review of Detonation Issue; Draft Deliverable; 0007

Dear Ms. Winn:

Enclosed please find the deliverable for the above-referenced work assignment. The deliverable was prepared as part of a technical directive from you on July 31, 2002 via an E-mail to Ms. Dreith of TechLaw. In the e-mail you requested that TechLaw review the LANL response to one comment of the TA-16 Notice of Deficiency, which dealt with "Potential to Detonate".

For the most part TechLaw found the NOD response from LANL on the "Potential to Detonate" acceptable. There were only a few issues which LANL should respond to, however we believe these issues to be fairly minor.

If you have any questions, please feel free to contact me at (303) 763-7188.

Sincerely,

June K Dreith

June K. Dreith
Project Manager

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Enclosure

cc: Mr. James Bearzi, NMED
Mr. David Cobrain, NMED
Mr. Carl Will, NMED
Mr. Tom Hall, TechLaw
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Los Alamos National Laboratories (LANL)
Review of NOD Issue
Pertaining to "Potential To Detonate"

Submitted by:

TechLaw, Inc.
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Submitted to:

Ms. Lee Winn
Mr. James Bearzi
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Santa Fe, New Mexico 87505

In response to:

Work Assignment No. 06110.040

August 2002

GENERAL COMMENTS

1. The response to the Notice of Deficiency (NOD) TA-16 Part B Application Revision 3.0, January 31, 2000, which is contained in the document from Los Alamos National Laboratories (LANL), is one that is based on common practices that are generally observed throughout the Department of Energy (DOE) when dealing with waste materials that have been contaminated by contact with energetic materials. These practices are derived from the procedures prescribed by the DOE Explosives Safety Manual (DOE M440.1-1) and are specifically implemented by each DOE facility using local regulatory and procedural documents. The DOE Explosives Safety Manual is based upon the DoD Ammunition and Explosives Safety Standards (DoD 6055.9-STD) and incorporates many provisions of that manual by reference. It also mirrors many of the provisions of the Army Material Command (AMC) Regulation 385-100 (AMC Safety Manual), which is the document used for procedures at the Army's manufacturing, research and development, and testing facilities for conducting operations involving energetic materials.

   Within the DOE, all materials which have been in contact with energetic materials are normally considered, as a matter of practice, to have been contaminated with those materials. Although the contamination may be extremely limited, the fact remains that a small container of waste tissues used to wipe down areas/items contaminated with or having energetic components will contain some amount of the material. Similar examples exist involving containers and related items used to transfer or contain energetics. While the amount present at a particular time may be at less than the concentration required to detonate, it is possible that settling or other redistribution (concentration) may occur due to movement of the container or other mechanical stimuli which the container receives. Soil containing energetics may not be homogeneous. As a result, the total concentration in a soil/energetics mixture may be less than the detonation threshold, but small pieces of energetics within the mixture may be able to detonate. In many instances, the actions necessary to homogenize the mixture or separate the small detonable pieces constitute an unacceptable explosives safety risk to personnel.

   In the case of energetics dissolved or suspended in solvents, the potential for concentration by evaporation, precipitation or settling is present. It is also possible for a container of waste items to have a significant portion of the items therein exceeding the concentration threshold for detonation, and another significant portion to have concentrations that are not detectable by routine methods. Normal policy is to consider the entire container as contaminated and to dispose of it by thermal treatment of some type. It is neither wise, from an explosive safety viewpoint, nor cost effective to suggest that the container be opened and sorted to separate the detonable items from those that will not detonate, particularly if small quantities of waste and/or extremely sensitive energetics are involved. This is congruent with the cardinal rule of explosives

safety, which is to limit the exposure of a minimum number of persons, for a minimum time, to a minimum amount of ammunition and explosives consistent with safe and efficient operations.

The practices described above often result in items contaminated with trace amounts of energetic materials and which are technically not detonable being treated thermally at OB/OD areas. However, testing each specific waste item to determine its detonability is often operationally impossible, expensive, time consuming, and may expose individuals to energetic materials unnecessarily. The testing may also result in the generation of additional waste materials contaminated with energetics. As a result, DOE and DoD manufacturing, research and development, and testing facilities which use energetic materials generally follow the procedures described in the response to the NOD.

SPECIFIC COMMENTS

1. **First Paragraph, page 7:** This paragraph uses the term "Class A Explosives" in reference to the high explosives (HE) waste streams treated by the facility. It should be noted that this term, along with the terms "Class B" and "Class C" explosives were replaced by the United Nations Organization (UNO) Hazard Classes in 1991. It should be noted, however, that these terms still exist in government and industry documents which have not been revised since the new terminology became mandatory. Both DOD and DOE have implemented the UNO Hazard Classes, so the obsolete terms should not be used to refer to energetic materials by their subordinate organizations, unless it is necessary to cross reference to the obsolete terms for some technical purpose.

   Ammunition and explosives are found in Classes 1 and 6. Most of the energetic materials treated by LANL will fall into Class 1. Class 1 contains six divisions, which are numbered 1 through 6, which further delineate the specific hazards represented by the particular energetic material or item.

   LANL should be requested to revise the document to use the current Class/Division hazard classification used by the DOE as per Chapter VI of DOE M440.1-1.

2. **HE Safety Issues with Small Amounts of HE, Pages 7 and 8:** The assertions in this section are correct and describe the basic HE safety concepts concerning small amounts of energetic materials. Both DoD and DOE use the "worst case scenario" when dealing with small quantities of energetics and will assume that any quantity, no matter how small, will detonate and has the potential to cause bodily harm.

3. **HE Wastes and HE-Contaminated Waste Treated by OB, Pages 8 and 9:** This section describes the explosives soils hazard testing methodology used by LANL

which determined that certain soils contaminated with 5% explosives mixtures were more sensitive than TNT, according to drop tests. There is no reason to doubt these tests, and the assertions made as to how the DoD 10% standard for reactive HE contaminated soil was established are valid. DOE use of HMX and RDX as a high percentage of their total explosives consumption began long before DoD use of these materials in similar percentages. Both of these explosives are more sensitive to most stimuli (heat, shock, impact, friction, static discharge, etc.) than TNT. The results of the drop test show the 5% total mixture of RDX, HMX and TNT with soil to be more reactive than TNT. This would be a valid reason to consider the 5% soil as hazardous from a detonation perspective and justifies the thermal processing of same.

This section also discusses the safety-based approach taken concerning HE (energetics) contaminated liquid waste streams. The practices described are conservative and very likely allow liquid wastes which are technically not detonable to be processed as detonable wastes from an explosives safety standpoint. However, since LANL does explosives research and development work on energetic materials which, in many instances, are state of the art materials which have not been fully characterized (often, the actual characterization is part of LANL's task with the developmental energetics), a very conservative explosives safety policy involving these often unknown characteristics of the energetics involved is justified in the presence of unknown/unquantified risk.

4. **Detonation Potential by Waste Stream, Pages 10-12:** This subsection of the section discussed in 2 above describes the detonation potential for the waste streams treated at the Burn Ground. As previously noted, the detonation scenarios presented are conservative and very likely allow wastes which are technically not detonable to be processed as detonable wastes from an explosives safety standpoint. While each scenario is viable, they very likely only occur as an exception to the norm on rare occasions. However, the risk of these potential occurrences and the resulting personnel safety implications must be carefully considered if other means of treating the waste streams are mandated.