



U.S. ARMY CHEMICAL MATERIALS AGENCY

## Bounding Transportation Risk Assessment for >1 Vapor Screening Level Waste

Spring 2011

### Why the Bounding Transportation Risk Assessment (TRA) for >1 Vapor Screening Level (VSL) was conducted

Secondary waste is generated during the Chemical Materials Agency's (CMA) disposal of the Army's stockpile of chemical agents and munitions. Management and disposal of this waste is a growing concern because of the limited capacity for treating this waste on site.

Offsite treatment of the secondary waste at a commercial treatment, storage and disposal facility (TSDF) has been recommended by the National Academies' National Research Council and is being considered as an alternative to on-site disposal. Shipment of the waste to a TSDF is a viable option because the secondary waste has very low levels of chemical agent contamination, so the potential risk to members of the public in the event of a transportation accident is small.

Several TRAs, to identify and assess the potential risks to members of the public, have previously been performed to support planned shipment of certain types of secondary waste from specific CMA facilities. These shipments were subsequently completed safely and without incident.

Rather than continuing to perform waste-specific and site-specific TRAs—a time and resource consuming activity—the Bounding TRA was conducted to establish upper bounds for the total number of secondary waste shipments and average headspace concentration (i.e., agent vapor concentration) in each drum. The guidelines of the Bounding TRA will be used to determine the transportability of secondary waste from any stockpile or non-stockpile site.



Drums are securely packaged in preparation for transport to off-site treatment and disposal facilities.

### What the Bounding TRA covers

The Bounding TRA specifically addresses public risk due to an accident during transport of secondary wastes containing low levels of:

- Sarin (GB)
- O ethyl S (2 diisopropylaminoethyl) methylphosphonothioate (VX)
- mustard (H, HD, and HT)

### What the Bounding TRA does not cover

The potential risks from transporting wastes with trace amounts of lewisite (L) or tabun (GA) were not specifically modeled in the Bounding TRA. The Acute Exposure Guideline Levels (AEGs) for GA are higher than or equal to those for GB which was modeled in the TRA, making the GB calculations bounding for GA. Only one CMA site will generate Lewisite-contaminated waste and they will prepare a site-specific TRA for its transportation.

The Bounding TRA also does not consider risk from potential accidents during handling, loading, or unloading the wastes at the originating facility/storage area or at the TSDF as these are addressed in separate documentation.

For more information, contact the CMA Public Affairs Office at (410) 436-3629 (800) 488-0648



## Bounding Transportation Risk Assessment for >1 Vapor Screening Level Waste (continued)

### How the Bounding TRA was prepared

The Bounding TRA was prepared using the traditionally accepted Army risk management approach derived from DA PAM 385-30, titled Mishap Risk Management (DA, 2007). This approach, coupled with conservative (pessimistic) assumptions regarding the likelihood of the accident and the severity of the resulting downwind hazard, was used to evaluate the conditions under which the waste may be shipped with acceptable risk and provide a detailed assessment of the public risk associated with an accident during shipment of this waste.

**The Bounding TRA specifically considered the following risks of release of agent in an accident during transportation:**

- Release of agent due to evaporation
- Release of agent during vehicle fire

**Determining bounding conditions.** The following steps were completed to determine the bounding conditions for shipment:

- Determine the hazard probability by estimating the truck accident probability using available data for hazardous material transportation accidents
- Based on the hazard probability, determine the corresponding hazard severity that would result in *low* risk
- Develop a set of bounding transportation accident scenarios to be assessed
- Characterize the hazard distances for these accident scenarios using the Army's atmospheric dispersion model, D2PC
- Determine the maximum agent concentration and/or agent mass in the waste that could be transported while remaining within the hazard severity constraints
- Determine the maximum number of shipments that could be completed safely

### How the Bounding TRA is used

Although secondary waste shipments from a specific site may meet the requirements of the Bounding TRA, the sites also must provide the following information in order for the initial waste shipments to be approved by CMA management:

- Details of the waste streams in the form of documented waste profiles
- Generator knowledge and/or monitoring data
- Details on methods of waste segregation and packaging
- Number, capacity (e.g., 55-gallon, 95-gallon, etc.), and type of drum (e.g., polyethylene, steel overpacked in polyethylene, etc.) for shipment
- Truck capacity and total number of shipments required
- TSDF to be receiving the waste and distance to the TSDF (miles)

CMA staff reviews this information and determines if the proposed shipment conditions (e.g., waste type, shipment distances, etc.) are bounded according to the Bounding TRA. The CMA director provides final approval for the shipments.

**Mitigation requirements.** Additionally, in order to ensure safe transport of the secondary waste, the Bounding TRA requires the following safety measures to be taken during shipment of the waste:

- Two drivers per vehicle with both drivers trained in Hazardous Waste Operations and Emergency Response
- Multiple vehicle caravans
- Global positioning satellite (GPS) tracking of the vehicles
- Frequent contact with the vehicle dispatcher
- Emergency response teams available along the route for environmental remediation following the initial response by the driver teams and local emergency responders

### Summary

The objectives of the Bounding TRA were to evaluate the conditions under which the waste may be shipped with acceptable risk and to provide a detailed assessment of the public risk associated with shipping the waste to a TSDF. These objectives were met through development of a methodology based on the Army's established risk management procedures. The Bounding TRA methodology included conservative assumptions to ensure the

safety of the public and the environment during transport of the waste.

A copy of the TRA, "Bounding Transportation Risk Assessment for >1 Vapor Screening Level (VSL) Waste," may be obtained from your local Chemical Stockpile Outreach Office or it may be viewed or downloaded at [www.cma.army.mil](http://www.cma.army.mil).