U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, D.C. 20590

MAY 2 2 2012

Mr. Elias V. Cantu
Safety Manager, Military Surface Deployment and Distribution Command
U.S. Department of Defense, Attn: AMSSD-SA
One Soldier Way,
Scott AFB, IL 62225

Ref. No. 12-0030

Dear Mr. Cantu:

This responds to your January 24, 2012 letter regarding the applicability of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) to a device that contains a compressed gas. According to your letter, a Raman cell ("the cell") contains methane gas pressurized at 1,000 to 1,200 psig and has a volume of 2.7 cm^3. The cell was proof tested to a safety factor of 2 times the maximum operating pressure (MOP) (i.e., 2,400 psig) without structural failure and a structural analysis shows a safety factor greater than 4 times the MOP (i.e., 4,800 psig). The cell is contained in a sealed laser unit lens and located near the housing for a resonator. By your calculations, if a structural failure allowing a leak from the cell were to occur in the lens housing or were to leak into the resonator housing, the percentage concentrations for methane are estimated at 0.8% and 47%, respectively, which are outside the bounds of the explosive limits for methane gas (i.e., 5% to 15%). You indicate that although highly unlikely, a partial leak in a concentration within the explosive limits could occur. In a telephone conversation with a member of my staff, you indicated that ignition of this minute amount of methane gas would be equivalent to the energy released from striking a match. Specifically, you ask for clarification whether the cell containing the compressed methane gas is subject to the HMR.

PHMSA regulates the transportation in commerce of materials it determines are hazardous in that "the amount and form [of the material] may pose an unreasonable risk to health and safety or property." 49 U.S.C. 5103, as delegated to PHMSA in 49 CFR 1.53(b). Based on the information provided in your letter and subsequent telephone conversation, the Raman cell is not shipped in a quantity and form that poses an unreasonable risk to health and safety or property during transportation and, therefore, is not subject to regulation under the HMR.

I hope this information is helpful. If you have further questions, please contact this office.

Sincerely,

Ben Supko
Acting Chief, Standards Development Branch
Standards and Rulemaking Division

Der kinderen §172.101 Applicability 12-0030

DEPARTMENT OF THE ARMY
MILITARY SURFACE DEPLOYMENT AND DISTRIBUTION COMMAND
1 SOLDIER WAY
SCOTT AFB, IL 62225-5006

Directorate of Safety (AMSSD-SA)

January 24, 2012

Standards and Rulemaking Division
Pipeline and Hazardous Materials Safety Administration
Attn: PHH-10
U.S. Department of Transportation
East Building
1200 New Jersey Avenue, SE
Washington, DC 20590-0001

In accordance with the provisions of Title 49, Code of Federal Regulations (CFR), Part 105, Section 105.20, the Department of Defense (DOD) hereby requests an Interpretation of the Hazardous Materials Regulations as outlined below. DOD petitions for a clarification of whether the HMR applies to the transportation of a small quantity of methane gas contained in Ramen cells. The following file number is assigned:

File Number: 03-12 (0124)
Re: Request for Interpretation – Ramen Cells

Proponent:
U.S. Department of Defense
Surface Deployment and Distribution Command
One Soldier Way
Scott AFB, IL 62225-5006
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The DOD has a need to ship weapons systems with Ramen Cell lenses which contain a minute trace of methane gas within a sealed laser unit lens. Please see attached Ramen Cell and Resonator Cavity dimensions (Att 1). Due to the safety performance testing conducted and the structural analysis of the outer packaging, we do not believe that it poses an unreasonable risk to health, safety or property when shipped in commerce and therefore should not be considered a hazardous material.

Rationale:
The Ramen Cell contains methane gas pressurized at 1000 to1200 psig. The gas cell volume is 2.7 cubic centimeters with a stored energy of less than 30 ft-lbs. A structural analysis of the Raman Cell was performed and results show a safety factor of greater than four times the maximum operating pressure of 4800 psig. The cell was also proof tested to a safety factor of greater than two times the maximum operating pressure of 2400 psig without any structural failure.

The conditions required for methane gas to ignite when mixed with normal air require a methane concentration level of between 5% (lower explosive limit (LEL)) and 15% (upper explosive limit (UEL)). The resonator is located in a 245.8 cubic centimeter dry nitrogen purged housing. If structural failure of the entire Raman Cell permitted leakage into this cavity, it is calculated that the concentration of methane would be greater than 47%, which is above the UEL and would not support ignition. In the

unlikely event a partial leak results in a 15% methane mixture in the housing, the energy released would be less than 1.4 BTU's. The lens housing structure is strong enough to contain the entire leak. In addition, the interior free space of the housing is greater than 28,000 cm3, and it has been calculated that a total cell leakage would result in a methane concentration of less that 0.8% which is below the LEL and would not support ignition.

The attached DOT Letter of Interpretation (Att 2) Ref. No. 09-0037 was issued for a similar situation – a very small amount of flammable gas contained in a glass tube which is inside of a larger container. If the flammable gas were released into the larger container the flammable gas concentration is well below the Lower Explosive Limit of the flammable gas. Our situation has the added safety margin in that the concentration of flammable gas in the glass tube is above the flammable range and therefore could not ignite in either the glass container or the metal housing.

To date, the Department of Army has transported well over 2,800 Ramen Cells in varying weapons systems using Military Air with no reported incidents.

This request is submitted by Mr. Elias V. Cantu, (618) 220-5041, e-mail elias.v.cantu.civ@mail.mil or usarmy.scott.sddc.mbx.omb-for-safety@mail.mil Safety Manager, Military Surface Deployment and Distribution Command, ATTN: AMSSD-SA, One Soldier Way, and Scott AFB, IL 62225.

Sincerely,

Daniel A. Maham
Director of Safety