Environmental Compliance & Transportation Information Bulletin

Edition 77. **December 2011**

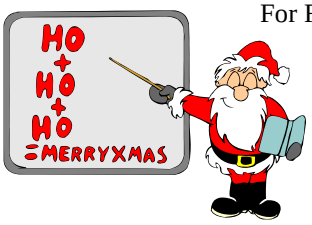
Editor's Corner

So, naughty or nice? Again, Christmas is right around the corner. My kids are now 14 and 10,and yes my daughter is now in high school, into dance and LOUD rap music. My son plays baseball, basketball and the piano and has recently taken up the snare drum, so the fun(and noise) never ends in my house. But, if the truth be known, I wouldn't have it any other way.

All else is fine in Omaha and in Huntsville as we prepare for the new year. I hope this newsletter finds all our coworkers and friends happy and healthy. The EM CX folks, and I wish you all a very happy and safe holiday season and hope to hear from you all in 2012!

Sandi Claus

Upcoming training sessions



For FY12, we will be traveling to Orlando for Spring Break, the week of March 19th, 2012 for the initial class and the recertification class will be 21 and 22 March in Orlando. (Wow, it only took me so, so many years to get a spring break in Florida!)

In addition, in the March/April 2012 time frame, we will be teaching the combine RCRC/DOT Class 7 course in Baltimore. Contact Rick Waples or Hans Honerlah if you are interested in attending this course.

Also, if you want to **schedule an onsite course**, please call Beverly VanCleef. This will be a busy year for onsite recertification courses, so get your request in early.

The FY12 PROSPECT Course manual and schedule, go to: http://ulc.usace.army.mil/

Remember, this training is open to ***all federal employees*** and everyone can and should register now!

As always, to schedule an onsite for initial training or refresher training, or to obtain additional information, contact: Joe Pickett, (256) 895-7445 or Beverly VanCleef at (402) 697-2559, e-mail: Beverly.D.Vancleef@usace.army.mil.

Discussion on how to determine the appropriate container for packaging that will be used to ship liquids. By Rick Waples

Recently our office has had questions from the field on how do you select a packaging that will contain liquids. We have developed a brief article to discussion on how the shipper would select the appropriate UN packaging just to meet the hydrostatic test pressure criteria for a shipment of liquid hazardous material.

Determination of Hydrostatic Test Pressure for Packaging Containing Liquids

Packaging/Container: 55 gallon – Closed Head Steel Drum
Intended for Liquids

Thickness: 16/16/16 gauge (1.5/1.5/1.5 mm) = Head/Body/Bottom. A drum intended for reuse or reconditioning as a single packaging or as an outer packaging of a composite packaging, must have the drum body thickness (in mm) marked on the container. Only the body thickness must be marked unless the head and bottom are different thicknesses.

UN Marking: U N **1A1/X1.8/300/11**
USA/ Manufacturer or Approval/Certifying Agency

Questions: 1. **How does the shipper determine if the hydrostatic pressure of the packaging (rated by the manufacturer) is appropriate for the liquid hazardous material being shipped?**
2. **Can Acetone be shipped in this drum based on the hydrostatic pressure rating?**

References:

- ASTM D4919 "Standard Guide for Testing Hazardous Materials in Packagings."
- ASTM D7660 "Standard Guide for Conducting Internal Pressure Test on United Nations (UN) Packagings."
- ASTM D323 "Standard Test Method for Vapor Pressure of Petroleum Products"
- Hazardous Material Regulations (HMR), 49 CFR 173 & 49 CFR 178.
- International Air Transport Association (IATA) "Dangerous Goods Regulations" – 53rd Edition

Background:

1. In this illustration, the Performance-Oriented Packaging (POP) standards (49 CFR 178-Subpart L) would define this packaging (1A1 container) as a non-removable head, steel drum suitable for shipping Packing Groups (PG) I, II or III hazardous materials (refer to "X" PG criterion). The POP standard also tells us that the drum is intended for liquids and is rated for a specific gravity of 1.8 (rounded down to the first decimal) and is rated for a hydrostatic test pressure of 300 kPa (43.5psi).

[**Note**: 1 kPa = 0.145 psig].

2. The applicability paragraph of Part 178 states that POP standards apply to the manufacturer of the packaging and §178.601(b) states that the manufacturer is responsible to assure that each packaging is capable of passing the prescribed tests which includes the hydrostatic pressure test. Section 178.605(d) identifies 3 methods for the manufacturer to hydrostatically test a packaging and rate it. The first method is based on the gauge pressure of the product in the packaging at an elevated temperature and applying a 1.5 safety factor. The next two methods are based on the vapor pressure of the hazardous material at 50° or 55 ^{o}C. The POP standards allow the use of the either temperature. In accordance with §178.503(a)(5)(i) the manufacturer must round down to the nearest 10 kPa the test pressure the packaging successfully passed. In addition, a PG I hazardous material must always be in a packaging rated for at least a "minimum hydrostatic test pressure" of 250 kPa (36 psig).

3. It is the shipper's responsibility (49 CFR 173.22) to examine the requirements in §§173.24, 173.24a, 173.24b and 173.27(aircraft) when selecting the appropriate packaging that has been rated by the manufacturer in accordance with Part 178. The container is selected after determining the proper shipping name and then determining what the authorized types of containers are from Column 8 of the Hazardous Material Table (Column 8B for non-bulk, §173.***). The shipper must examine the liquid hazardous material (i.e. MSDS, CRC Handbook) that is being shipped to verify that the hydrostatic test pressure requirements of §173.24a(b)4 (i) to (iii) are met . If the packaging is going to be transported by aircraft, there may be additional requirements in §173.27 that would need to be addressed. For example, the inner packagings of a combination packaging, intended to contain liquids and shipped by air, must be capable of passing a pressure differential test (49 CFR 173.27(c) that is not required for surface transportation modes. Furthermore, a hydrostatic test pressure of 100 kPa for a PG II or III material may not be an adequate hydrostatic test pressure and likewise a 250 kPa (minimum) for a PG I hazardous material may not be adequate if the specific liquid being shipped has a high vapor pressure.

4. Vapor pressure may not be a major concern for many hazardous material liquids that are shipped and the default of 100 kPa may be more than adequate for most PG II or III liquids or 250 kPa for PG I liquids. However, the shipper should always be considering the mode of transportation (e.g. aircraft) and the hydrostatic test pressure of liquids especially those with a high vapor pressure to ensure the hydrostatic test pressure of the packaging is appropriate.

Answers: Question 1.

1-1. If you refer to §173.24a(b)(4) there are three methods (subparagraphs (i), (ii) or (iii)) for the shipper to determine if the liquid can be placed into the packaging and be authorized to ship based only on the hydrostatic pressure criteria. It is important to note that the shipper utilizes the same methods used by the manufacturer to originally rate the hydrostatic test pressure for the packaging but the shipper is required to apply an additional safety factor.

1-2. The shipper would apply the appropriate Safety Factor (SF) of 2/3 or 4/7 of the packaging's rated hydrostatic test pressure depending on the test method used to make sure the actual pressure is well below the packaging rating. In addition to the HMR citations provided below, IATA Dangerous Goods Regulations, paragraphs 6.3.5.3 & 5.0.2.9 & 5.0.2.14 are helpful in explaining how to calculate the hydrostatic test pressure by the 3 methods. It is important to recognize that IATA regulations (air mode) includes a minimum packaging pressure differential requirement of not less than 95 kPa for liquids or 75 kPa for PG III of Class 3 or Division 6.1, or a pressure related to the vapor pressure of the liquid to be conveyed, whichever is greater. Pressure is gauge pressure taken at the top of the package.

<u>Method A:</u>

Manufacturer [§178.605(d)(1)]: $P_T = [P_{M55} \times 1.5]$ kPa, (*IATA Minimum of 95 kPa or 75 kPa*);
Shipper [§173.24a(b)(4)(i)]: $Vp_{55} \leq 2/3\ P_T$

<u>Method B:</u>

Manufacturer [§178.605(d)(2)]: $P_T = [(Vp_{50} \times 1.75) - 100\ \text{kPa}]$, (*DOT & IATA Minimum P_T of 100 kPa*);
Shipper [§173.24a(b)(4)(ii)]: $Vp_{50} \leq 4/7\ (P_T + 100\ \text{kPa})$

<u>Method C:</u>

Manufacturer [§178.605(d)(3)]: $P_T = [(Vp_{55} \times 1.5) - 100\ \text{kPa}]$, (*DOT & IATA Minimum P_T of 100 kPa*);
Shipper [§173.24a(b)(4)(iii)]: $Vp_{55} \leq 2/3\ (P_T + 100\ \text{kPa})$

Where:
$\mathbf{P_T}$ = test pressure in kPa (gauge)
$\mathbf{P_{M55}}$ = gauge pressure measured in the filled packaging at a temperature of 55 ^oC (130 ^oF) [i.e. the vapor pressure of the filling liquid and the partial pressure of the air or other inert gases minus 100 kPa]
$\mathbf{Vp_{50}}$ = vapor pressure at 50 ^oC (122 ^oF)
$\mathbf{Vp_{55}}$ = vapor pressure at 55 ^oC (130 ^oF)

1-3. IATA (Table 5.0.A) has provided a table to illustrate how the Test Pressure Marking would work for Method C (Temperature at 55 ^oC) [IATA paragraph 5.0.14.2(c)].

UN #	PSN	Class/ Div	PG	Vp_{55} (kPa) Find on MSDS or in CDC Handbook	Vp_{55} x 1.5 (kPa)	[(Vp_{55} x 1.5) minus 100] (kPa) P_T	Minimum Test Pressure (gauge) Method C (kPa) IATA ¶6.3.5.3	Minimum Test Pressure (gauge) to be Marked on the Packaging (kPa)
2056	Tetrahydrofuran	3	II	70	105	5	100	100
2247	n-Decane	3	III	1.4	2.1	-97.9	100	100
1593	Dichloromethane	6.1	III	164	246	146	146	150
1155	Diethyl ether	3	I	199	299	199	199	250
1710	Trichloroethylene	6.1	III	40	60	-40	100	100
1090	Acetone	3	II	97	146	46	100	100
1114	Benzene	3	II	47	71	-29	100	100
1294	Toluene	3	II	16.6	25	-75	100	100
-	Water	-	-	15.7	24	-76	100	100

Note: For pure liquids, the vapor pressure at 55^oC (130 ^oF), Vp_{55}, can often be obtained from scientific tables. The Diethyl ether must be in a packaging rated for a minimum of 250 kPa because it is a PG I.

1-4. A useful source of vapor pressure for some common chemicals may be found in the "CRC Handbook of Chemistry and Physics or at: http://s-ohe.com/vp_data.html . The Material Safety Data Sheet would be another source for the vapor pressure information for a commercial chemical. In many cases, the vapor pressure of water might be the best choice. To convert mmHg@ 0 ^oC to kPa (.145psi), you would multiply the vapor pressure in mmHg x 0.133 to obtain what the vapor pressure is in kPa.

Question 2.

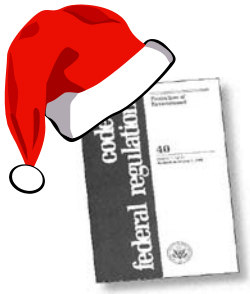
2-1. Acetone was determined to have a vapor pressure of 97 kPa (14.7 psig) at 55 ^0C from a manufacturer's MSDS. The shipper would want the packaging to meet the following requirement: $Vp_{55} \leq 2/3\ (P_T + 100\ kPa)$ or $97\ kPa \leq 2/3\ (46\ kPa + 100kPa) = 97\ kPa$. So the acetone must be in a packaging that has a hydrostatic test pressure rating of 100 kPa. Our specified drum was rated at 300 kPa so it is more than adequate to ship acetone by highway or rail.

Summary for What Does this Mean to the Shipper?

In many, if not most shipments, the hydrostatic test pressure of the packaging/container will not be an issue for the shipper especially for the surface mode shipments. The DOT minimum for PG II & III liquid hazardous materials of 100 kPa (14.5 psig) will typically be adequate. However, the shipper must be aware of the hydrostatic test pressure criteria for situations where a liquid is a hazardous material, has a high vapor pressure and the packaging is potentially exposed to the sun

which could elevate the vapor pressure in the packaging. The air mode shipments of liquid hazardous materials would also be of concern with the differential pressures that can be created by the altitude changes. Keep in mind that liquid hazardous materials that are Packing Group I shipments, must be shipped in a packaging that has a "minimum test pressure" of 250 kPa (36 psig). The shipper can use the MSDS or CRC handbook as discussed above to find the vapor pressure for most liquids. If dealing with a mixture of liquids, a conservative approach would be to determine the vapor pressure based on the most volatile chemical or to determine it in accordance with ASTM standards.

If you have questions after reading this article on selecting the appropriate packaging to meet the hydrostatic test pressure requirement of the regulations, you may contact Rick Waples at (402) 697-2560, or email: richard.j.waples@usace.army.mil.

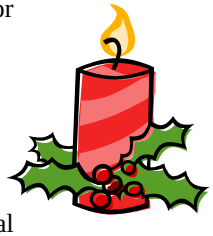


Regulatory Update for September through November

Note that this update just provides registers of interest pertaining to the management and transportation of hazardous materials and hazardous wastes. See our web site for a more complete listing of EPA Federal Registers that impact all Corps environmental work: http://www.environmental.usace.army.mil/regulatory.htm

The entire register can be accessed at http://www.gpo.gov/fdsys/browse/collection.action?collectionCode=FR (This is a new site and the way you find things is a bit more complicated.)

11/3/2011 p 68170 Instructions for Implementing Sustainable Locations for Federal Facilities in Accordance With Executive Order 13514
Action: Notice of availability of sustainable locations for Federal facilities implementing instructions
Summary: The Council on Environmental Quality has issued instructions to Federal agencies for integrating sustainable facility location decision-making principles into agency policies and practices, as required under Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance." The purpose of the Executive Order is to establish an integrated strategy toward sustainability in the Federal Government including, efforts to operate high performance sustainable buildings in sustainable locations, and strengthen the vitality and livability of the communities for Federal agencies. Section 2(f) of the E.O. 13514 directs agencies to "advance regional and local integrated planning by … participating in regional transportation planning and recognizing existing community transportation infrastructure;… ensuring that planning for new Federal facilities or new leases includes consideration of sites that are pedestrian friendly, near existing employment centers, and accessible to public transit, and emphasizes existing central cities and, in rural communities, existing or planned town centers." Section 5(b) of E.O. 13514 directs the Chair of CEQ to issue instructions to implement the Executive Order. The Instructions for Implementing Sustainable Locations for Federal Facilities are now available at:
http://www.whitehouse.gov/administration/eop/ceq/sustainability/sustainable-locations
Applicability: The Executive Order and implementing instructions apply to all Federal agencies, including Department of Defense.
Reference: http://www.gpo.gov/fdsys/pkg/FR-2011-11-03/pdf/2011-28474.pdf



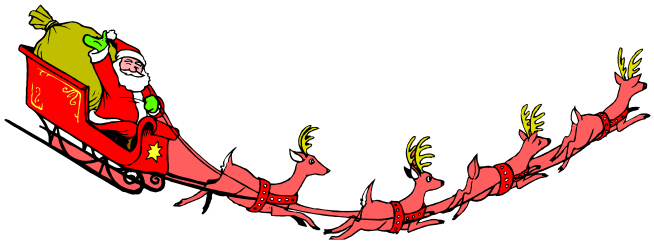
10/18/2011 p 64974 – p 64975 Commerce in Explosives; List of Explosive Materials (2011R–18T)
Action: Notice of list of explosive materials
Summary: Pursuant to 18 U.S.C. 841(d) and 27 CFR 555.23, the Department must publish and revise at least annually in the Federal Register a list of explosives determined to be within the coverage of 18 U.S.C. 841 et seq. The list covers not only explosives, but also blasting agents and detonators, all of which are

defined as explosive materials in 18 U.S.C. 841(c). This notice publishes the 2011 List of Explosive Materials.
Applicability: For general information purposes.
Reference: http://www.gpo.gov/fdsys/pkg/FR-2011-10-19/pdf/2011-26963.pdf

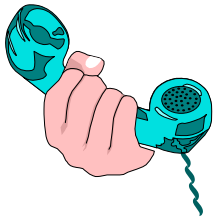
10/12/2011 p 63252 – 63257 Hazardous and Solid Waste Management System: Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals From Electric Utilities
Action: Notice of data availability and request for comment
Summary: This announces and invites comments on additional information relative to a 6/21/2010 Federal Register regarding coal combustion residues from electric utilities.
Applicability: This issue has been of interest to DoD because projects sometimes involve reuse of coal combustion residues as components of concrete.
Reference: http://www.gpo.gov/fdsys/pkg/FR-2011-10-12/pdf/2011-26086.pdf

09/13/2011 p 56304 – p 56318 Hazardous Materials: Minor Editorial Corrections and Clarifications
Action: Final rule
Summary: This corrects editorial errors, makes minor regulatory changes and clarifications. These are non-substantive changes and do not impose new requirements.
Applicability: Provided for general information purposes.
Reference: http://www.gpo.gov/fdsys/pkg/FR-2011-09-13/pdf/2011-23167.pdf

Do you have a "burning" regulatory question? Call us or e-mail us at http://www.environmental.usace.army.mil/tech_reg.htm



Merry Christmas to all and to all a good night!



EC&T Information Bulletin
P r e p a r e r
Sandi Zebrowski
The Information Bulletin is distributed quarterly by the
Environmental and Munitions Center of Expertise
Telephone 402-697-2555/2559
sandi.m.zebrowski@usace.army.mil