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EPA Updates Regulations for Fuel Conversion Systems

By Abdul H. Khalid, Chemical Engineer, HTIS

The U.S. Environmental Protection Agency (EPA) streamlined regulations for vehicle and engine fuel conversion systems to comply with Executive Order (EO) 13563 of January 18, 2011, and made it easier for manufacturers to sell those fuel conversion systems. Conversion systems alter an existing vehicle or engine to enable it to run on a different type of fuel. The process may be attractive to consumers who are concerned with energy security, fuel costs, or emissions. An example of this type of conversion is converting a car with an engine designed for gasoline to run on compressed natural gas (CNG).

Previous EPA regulations required vehicle and engine conversion systems to be covered by a certificate of conformity to gain a regulatory exemption from potential tampering charges. The EPA evaluated the requirement, and determined that it is appropriate to introduce new flexibilities for all clean alternative fuel converters, and to expand the compliance options for certain categories of conversions. The EPA amended the regulatory procedures in 40 CFR part 85 subpart F and part 86 to establish new compliance options. The new compliance program enables conversion manufacturers to qualify for an exemption from tampering by demonstrating that the converted vehicle or engine satisfies EPA emissions requirements. The specific demonstration and notification requirements differ based on the age of the vehicle or engine being converted. Under the new regulations, testing and compliance procedures differ based on one of the following age categories of the vehicle or engine that is converted: new and relatively new, intermediate age, or outside of the useful life.

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The demonstration and notification requirements for new and relatively new vehicles and engines will continue to involve a certification process that is very similar to previous practice. Once certified, however, annual recertification will no longer be required to maintain the tampering exemption. The notification and demonstration requirements for intermediate age vehicles and engines include testing and submission of data to show that the converted vehicle or engine continues to meet applicable standards. The notification and demonstration process for outside useful life vehicles and engines involves submission of a description of the conversion system that provides sufficient technical detail to determine that the conversion will not increase emissions.

Engine Certification Data is important when determining a fuel conversion system and the EPA has made certification data from various engine manufacturers for past and current model years easily available on its web page at: http://www.epa.gov/otaq/certdata.htm. To find certified clean alternative fuel conversion systems for heavy-duty highway engines, search the list of certificates that are available in the on-highway engine certification data section website at: http://www.epa.gov/otaq/certdata.htm#largeng. The conversion systems on this list have been certified by the EPA as meeting applicable emission standards and are exempt from the Clean Air Act (CAA) tampering prohibition (as long the conditions under which the certificate was issued remained unchanged, 40 CFR 85.505 (g)). Although this list is not comprehensive, it includes all conversion certificates that the EPA has issued through 2011, plus heavy-duty 2011 conversion certificates that manufacturers specifically requested that the EPA include. Certified fuel conversion systems that do not appear on this list are also exempt from the tampering prohibition.

The EPA recommends the use of properly engineered fuel conversion systems that reduce or decrease emissions, as opposed to poorly designed systems that lead to more pollution, when converting fuel systems.

The EPA expects the streamlined regulations approach to make the conversion process easier, encourage innovation, and stimulate conversions to optimize clean air and clean energy technologies. In addition, this approach will provide companies freedom of choice and flexibility to comply with the established performance standards, resulting in cost savings for many converters.

According to the General Service Administration (GSA), it does not purchase nor provide fuel conversion systems for DoD use. GSA purchases ready-to-use vehicles directly from manufactures that arrive with the fuel system (i.e. electric, compressed gas, and etc) that GSA desires, therefore converting to a desired fuel system with a fuel conversion system is not necessary.

In a presidential memorandum dated May 24, 2011 following up on Executive Order 13514 of October 5, 2008, the President informed agencies that by December 31, 2014, "all new light-duty vehicles leased or purchased by agencies must be alternative fueled vehicles, such as hybrid or electric, compressed natural gas, or biofuel."

The president's directive also says that within 90 days the GSA will distribute to all agencies an allocation methodology to determine how to evaluate their vehicle inventories

References:

1. EPA's News Release, March 30, 2011, "EPA Streamlines Regulations for Car and Truck Fuel Conversion Systems/New options encourage innovation, maintain air quality protections" website at: http://yosemite.epa.gov/opa/admpress.nsf/0/8792384DC33BD99185257863005EB4B7

2. Alternate Fuel Conversions, website at: http://www.epa.gov/otaq/consumer/fuels/altfuels/altfuels.htm

3. Engine Certification Data, website at: http://www.epa.gov/oms/certdata.htm.

4. Improving Regulation and Regulatory Review, Executive Order 13563 of January 18, 2011, web site at: http://www.regulations.gov/exchange/sites/default/files/doc_files/President's%20Executive%20Order%2013563_0.pdf

5. EPA's Office of Transportation and Air Quality, website at: http://www.epa.gov/otaq/.

6. Certified Alternative Fuel Conversion System, as of April 7, 2011, website at: www.epa.gov/otaq/consumer/fuels/altfuels/certified-conversions.xls.

7. Presidential Memorandum – Federal Fleet Performance, May 24, 2011 http://www.whitehouse.gov/the-press-office/ 2011/05/24/presidential-memorandum-federal-fleet-performance.

DoT News

New IMDG Regulations for the Transport of Vehicles and Equipment

By Muhammad Hanif, Chemist, HTIS

The United States Department of Transportation (DoT) has historically regulated vehicles or equipment with internal combustion engines as hazardous material under Title 49, Code of Federal Regulations (49 CFR) using United Nations (UN) identification number UN3166 when these assets are powered by a flammable liquid or gas, and transported within DoT's jurisdiction. Previously, the International Maritime Dangerous Goods (IMDG) Code did not regulate these vehicles or equipment. However, the International Maritime Organization (IMO) has adopted new regulations that will extend its regulatory controls to the international transport of vehicles or equipment with internal combustion engines. Manufacturers and distributors of motorized equipment powered by internal

combustion engines that use (1) flammable liquid or gaseous fuels or (2) fuel cells powered by flammable liquids or flammable gases will soon be subjected to mandatory regulations when such equipment or engines are offered for transport, internationally, by water. In addition to manufacturers and distributors, Department of Defense (DoD) Distribution Depots and Centers that prepare such equipment for OCONUS shipment by water must comply with the new regulations.

With the publishing of Amendment 35-10 of the IMDG Code, the International Maritime Organization authorized voluntary use of the Amendment on January 1, 2011, and mandatory use on January 1, 2012. The IMO is responsible for maintaining and updating the IMDG Code that governs the vast majority of shipments of hazardous materials by water. The Code is based on the UN Model Regulations, but also includes additional requirements (e.g., requirements for marine pollutants, freight containers loading procedures, stowage and segregation and other requirements applicable to shipboard safety and preservation of the marine environment) applicable to the transport of hazardous materials by sea that are not covered by the UN Model Regulations.

The IMO has adopted the provisions included in the 16th Revised Edition of the UN Model Regulations as they pertain to UN3166, and the following Proper Shipping Names: ENGINE, INTERNAL COMBUSTION or VEHICLE, FLAMMABLE GAS POWERED or VEHICLE, FLAMMABLE LIQUID POWERED, or ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED, all of which are associated with hazard class 9. In addition to vehicles or equipment with internal combustion engines, the IMDG Code includes hybrid electric vehicles or machinery powered by both a fuel cell and internal combustion engine with either installed electric or wet or sodium or lithium batteries.

Since the international regulations and the U.S. regulations are not in complete harmony with respect to the definition of combustible liquids, confusion may occur in situations where different grades of diesel fuel having different flash points are used. The IMDG Code defines flammable liquid fuels as those with a flash point equal to or less than 60°C (140°F), while 49 CFR continues to regulate combustible liquids with a flash point above 60°C and below 93°C (200°F). According to 49 CFR, a flammable liquid with a flash point at or above 38°C (100F) and not meeting the definition of any other hazard class, may be reclassified as a combustible liquid. Shippers of these vehicles and equipments should remember that the provision in 49 CFR for reclassifying flammable liquids with a flash point at or above 38°C (100F) as a combustible liquid does not apply to transporting by vessel, except where other means of transportation are impractical.

Under Special Provision (SP) 961, the IMDG Code provides regulatory relief for vehicles and equipments stowed on a roll-on/roll-off ship, or stored in another cargo space. In the latter case, the competent authority of the nation under which the vessel is registered designates and approves the specifically designed cargo space for the carriage of vehicles and equipment. Furthermore, the vehicles and/or equipment must be inspected and no signs of leakage from the battery, engine, fuel cell, compressed gas cylinder or accumulator, or fuel tank must be found. Exceptions are also provided in the IMDG Code for vehicles and equipment that contain no fuel, and their batteries are protected from short circuit. But, operational considerations often make it impractical to load and unload such vehicles and equipment when their fuel tanks are empty, and those vehicles must meet the special provisions applicable to the various types and quantities of fuel used to power them. If any of the conditions set forth in SP961 are not met, the vehicles or equipment will be subjected to exceptions under SP962 for hazard class 9. In addition, vehicles and equipment with batteries installed must be protected from short circuit and in the case of lithium ion or lithium metal batteries, must meet the testing criteria of the UN Manual of tests and criteria, or must have been approved by the competent authority.

A shipment of hazardous materials that is not prepared in accordance with DoT's or International Hazardous Material Regulations (HMR) may not be offered for transportation by air, highway, rail, or water. Each hazmat employer is required to ensure that each hazmat employee is trained for transportation issues, in accordance with the HMR. Employees, whether DoD employees or contractors who prepare vehicles or equipment identified as UN3166 or other hazardous material for transportation by ship must comply with the DoT and IMDG Code requirements to prevent mishaps and penalties at the port terminals and on the ships.

References:

1. Amendments to the IMDG Code (resolution MSC. 122(75)), Circular letter No.2999,

6 October 2009, International Maritime Organization, London UK.

2. Federal Register (FR) Volume 76, Number 12, Wednesday, January 19, 2011, pages 3307-3389 (76 FR 3307).

New Regulations for Ocean Transport of Nickel-Metal Hydride Batteries

By Muhammad Hanif, Chemist, HTIS

Nickel-metal hydride (NiMH) batteries are primarily rechargeable batteries that use a hydrogen-absorbing alloy for the negative electrode and nickel oxyhydroxide for the positive electrode. NiMH batteries have two to three times the energy capacity of other equivalent size batteries. These batteries were not regulated for transportation until Amendment 35-10 of the International Maritime Dangerous Goods (IMDG) Code became effective on January 1, 2011, (mandatory on January 1, 2012), and after the U.S. Department of Transportation's

(DoT's) harmonization of its Hazardous Material Regulations (HMR) with the international regulations. Due to several incidents involving shipments of NiMH batteries, the International Maritime Organization (IMO) Sub-Committee on Dangerous Goods, Solid Cargoes and Containers (DSC) "fast tracked" the proposal to adopt controls over these batteries during ocean transport.

Fires caused by nickel-metal hydride batteries were the main concern that led to the new regulations. Different factors such as manufacturing defects, methods of packing, and damage to packaging after manufacturing were believed to facilitate short circuits that generate heat. The resulting increase in temperature causes further damage, that leads to a greater number of short circuits, and a worsening situation resulting in fire, as well as the possible release of explosive concentrations of hydrogen gas. This mechanism has parallels with those of self-heating reactions in unstable materials that lead to spontaneous combustion and a fire.

The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) amended its Hazardous Materials Regulations on January 19, 2011, to better align them with the international standards. Among the amendments are changes to proper shipping names, hazard classes, packing groups, special provisions, packaging authorizations, air transport limited quantities, and vessel stowage requirements. Of particular interest to the DoD community is the introduction of the proper shipping name "Batteries, nickel-metal hydride", UN3496 under hazard class 9 for shipping via vessel. This new Table 172.101 entry for UN3496 includes a W in Column (1) to indicate that the use of this hazardous materials description is limited to the transport of these materials by vessel. The PHMSA also amended Special Provision (SP) 130 and added a new SP340 that is applicable only to the vessel transport of nickel-metal hydride batteries as cargo.

When the IMO adopted the new entry under UN3496, it also added a new SP963 to Part 3 - Dangerous Goods List, Special Provisions and Exceptions to the IMDG Code. Amendment 35 10 of the Code includes the new entry "UN3496, BATTERIES, NICKEL-METAL HYDRIDE, Class 9", as well as SP117 and SP963 included in Column (6). The Packing Instruction in Column (8) reads "See SP963" and Column (16) reads "Category A", keep away from "sources of heat".

Nickel-metal hydride button cells, Nickel-metal hydride cells, and batteries packed with, or contained in equipment are not subject to the provisions of the new code as noted in SP963. All other Nickel-metal hydride cells or batteries shall be securely packed and protected from short circuits (i.e. blister packs, partitioned packaging, or covered terminals etc.). They are not subject to other provisions of this Code provided they are loaded in a cargo transport unit (CTU) in a total quantity of less than 100 Kg gross mass per CTU. When loaded in a CTU in a total quantity of 100 Kg gross mass or more, they are only regulated by sections 5.4.1, 5.4.3, and Column 16 of the dangerous goods list in Chapter 3.2. The requirements of these sections are: (1) dangerous goods transport documentation to accompany the shipment, (2) the shipment must be described as "UN3496, BATTERIES, NICKEL-METAL HYDRIDE, CLASS 9" on the shipper's declaration for dangerous goods, and (3) the dangerous goods description must also be entered on the Dangerous Cargo Manifest and/or the detailed stowage plan in compliance with the IMDG Code requirements for shipboard documentation.

In the Federal Supply System, NiMH batteries are cataloged mainly in FSC 6140 (secondary batteries - chargeable). There are also some NiMH batteries in FSC 6135 (primary - non-rechargeable). The DoD uses NiMH batteries in many of its portable power applications, such as in handheld communication devices, backup power units, and in life saving/support equipment. The batteries are also used in fixed/stationary applications on ships and at airports.

References:

1. Amendments to the IMDG Code (resolution MSC. 122(75)), Circular letter No.2999, 6 October 2009, International Maritime Organization, London UK.

2. Federal Register (FR) Volume 76, Number 12, Wednesday, January 19, 2011, pages 3307-3389 (76 FR 3307).

3. United Kingdom Mutual Steam Ship Assurance Association (Bermuda) Limited (known as UK P&I Club) Bulletin 667, Friday December 2009, Nickel-Metal Hydride Batteries.

Transporting Magnetized Materials

By Muhammad Hanif, Chemist, HTIS

Hazardous Technical Information Services often receives questions from the Defense Distribution Depots on whether an item is magnetized or not. This article provides some basic rules to consider when answering such questions.

Magnetized materials are regulated when they have the magnetic strength to affect an airplane's compass or instrumentation. The International Civil Aviation Organization's (ICAO's), Technical Instructions for the Safe Transport of Dangerous Goods by Air (Technical Instructions) Packing Instruction 953, describes the test methods for measuring magnetic field strength. Additionally, even if unit of issue (UI) packages of magnetic materials do not, alone, meet the definition of a magnetized material, cumulative amounts of these packages might affect aircraft instruments, and are therefore subject to special stowage requirements.

The magnetic field measurement is expressed in gauss and is based on tests conducted by the Federal Aviation Administration (FAA) to determine when a magnetic material would adversely affect the operation of an aircraft. In a 1987 advisory, entitled "Preparation and Loading of Magnetic Materials for Air Transportation", the FAA concluded that a material with

a measurable magnetic field of more than 0.00525 gauss, at a distance of 4.5 meters from any surface of the package, can cause an aircraft's magnetic compass or compass master unit to have "compass deviations as high as 125 degrees, cause navigational errors, and jeopardize the safety of the transporting aircraft". Magnetic fields of this strength will affect older or smaller aircraft because they may have magnetic master units located inside or near their cargo compartments.

Under the provisions of 49 CFR Sections 171.22-171.24, when all or part of the transportation of a hazardous material is by aircraft, DoT's Hazardous Material Regulations (HMR) give shippers and carriers the option of preparing shipments of hazardous materials in conformance with the ICAO Technical Instructions.

On January 1, 2011, the ICAO revised its requirements for transporting magnetic materials by aircraft in its 2011-2012 Edition of the Technical Instructions. These changes substantially revised the requirements for shipping magnetized material that had been set forth in former Packing Instruction (PI) 902, placed the revised language in a new **PI** 953, and deleted **PI** 902. Specifically, the new requirements permit magnetized materials to be transported by aircraft with magnetic field strengths that can cause a compass deflection of 2 degrees or more at a distance of 2.1 meters, but not more than 2 degrees at a distance of 4.6 meters (equivalent to 0.418 amperes per meter (A/m) or 0.00525 Gauss measured at a distance of 4.6 meters). In addition, PI 953 excepts magnetized materials from all other requirements under the ICAO Technical Instructions provided they comply with the following:

- The shipper must make prior arrangements with the operator (i.e., carrier) to identify the magnetized material. The dangerous goods transport document requirements of ICAO Technical Instructions, Part 5, Chapter 4, are not applicable provided alternative written or electronic documentation includes the words "magnetized material" in association with the description of the goods;
- The package must bear the magnetized material handling label (as shown in Figure 5-24 of Part 5; Chapter 3 of the 2011-2012 ICAO Technical Instructions);
- The operator must stow the packaged magnetized material in accordance with Part 7, Section 2.10; and
- The incident reporting requirements of Part 7, Section 4.4 must be met.

PI 953 requires magnetized material with a field strength sufficient to cause a compass deflection of more than 2 degrees at a distance of 4.6 meters to be transported only with the prior approval of the appropriate authority of the State (i.e., country) of origin, and the State of the operator. However, the ICAO Technical Instructions require magnetized material that is not excepted from regulation to be described on a shipping paper as "UN 2807, Magnetized material, 9 (miscellaneous)"; and marked and packaged as prescribed in PI 953. The package must also be labeled with a MAGNETIZED MATERIAL label that complies with the image in Figure 5-24 at Part 5; Chapter 3 of the ICAO Technical Instructions. However, packages correctly labeled with the MAGNETIZED MATERIAL label under the ICAO Technical Instructions do not need to bear the Class 9 (MISCELLANEOUS) label (see § 3.2.11).

Magnetized material (in UI package, unit container pack having multiple UI packages, or unitized load) with a field strength causing a compass deflection of not more than 2 degree (equivalent 0.002 Gauss) at a distance of 2.1 meters, is not considered to be magnetized material, and hence is not subject to HMR nor ICAO requirements. However, unless the packaging is extremely secure, and there is no chance that the contents will shift or its shielding damaged in transit, it is safer to proceed as though the package comes under the dangerous goods regulations.

Table 1 below depicts information described in the above paragraphs concerning whether a material is regulated by air as a magnetized material, or is excepted from other requirements.

Magnetized or excepted magnetized material is regulated ONLY for air mode of transportation. A shipment of magnetized materials that is not properly identified or not prepared in accordance with ICAO may not be offered for air transportation. It is the responsibility of each hazmat employer, subject to the requirements of HMR, to ensure that each hazmat employee is trained in accordance with the requirements prescribed in the HMR and ICAO. Employees, DoD or DoD contractors, who prepare magnetized material, whether excepted or identified as UN2807 for air, must comply with the DoT and ICAO requirements to prevent mishaps in air shipments, and to avoid FAA penalties. The employees must meet the mandatory training requirements of Part 1, Chapter 4 of the ICAO Technical Instructions and for U.S. transport, the provisions of Subpart H of Part 172, 49 CFR, applicable to training of hazmat employees.

Compass Deflection at a Distance	Material	Requirements
2 degree or less (0.002 Gauss) at 2.1 meter (7 Ft).	Not regulated as magnetized	Not regulated by any mode
Greater than 2 degree (0.002 Gauss) at 2.1 meter (7 Ft) but 2 degree or less (0.00525 Gauss) at 4.6 meter (15 Ft)	Not regulated as magnetized (UN2807) – additional requirements apply	ICAO excepts from other requirements if all additional requirements in PI 953 are followed.
Greater than 2 degree (0.00525 Gauss) 4.6 meter (15 Ft)	Regulated as magnetized – UN2807	Regulated by air only with prior Competent Authority Approval

TABLE 1. Magnetized Material Requirements

References:

1. Federal Register Volume 76, Number 12, Wednesday, January 19, 2011, pages 3308-3389 (76 FR 3308).

2. The International Civil Aviation Organization Technical Instructions for the Transport of Dangerous Goods by Air, 2011-2012 Edition.

3. DoT PHMSA document reference number 09-0084, March 21, 2011.

4. DoT FAA Advisory Circular "Preparation and Loading of Magnetized Material for Air Transportation", March 19, 1987.

Environmental News

EPA Manages Chemical Priorities by Using Chemical Action Plans

By Philip Saunders, Chemical Engineer, HTIS

On April 13, 2011, the Environmental Protection Agency (EPA) released its Chemical Action Plans (CAP) for two chemical families, Toluene Diisocyanates (TDI) and Methylene Diphenyl Diisocyanates (MDI). These new CAPs joined eight others previously released for other chemicals or chemical families. The EPA created the CAP program in 2009 as part of an effort to enhance the way that the EPA managed its enforcement effort priorities, under the Toxic Substances Control Act (TSCA) and the Pollution Prevention Act. This article addresses the origin of chemical action plans, their purpose, how they are selected, and the information that they convey, as well as a brief description of the most recently released CAPs for MDI and TDI.

The EPA created the Chemical Action Plan concept in an effort to enhance its Existing Chemicals Programs as part of the regulatory activities authorized by TSCA. The purpose of the CAP is to aid in identifying chemicals that are of particular concern and to quickly evaluate them to determine the necessary courses of actions that should be taken to address those concerns. A CAP also allows the Agency to prioritize its actions, and informs government and the public of the EPA's near term action plans.

As an initial step in this process, the EPA established a list of chemical candidates that needed an action plan. According to the EPA, these chemicals were selected based on a number of factors, such as having a high production volume, their presence in consumer products, or having high risk factors of being environmentally persistent, bioaccumulative or toxic. The EPA also studied chemicals that show up in human biomonitoring studies, chemicals that are being investigated or reviewed by international organizations, and chemicals that may have reproductive or developmental effects.

The publicized evaluation and chemical selection process has been subjected to some criticism due to a perceived lack of stake-holder input and suggestions that the process may be influenced by a chemical's high profile and/or public perception, rather than relying on an evaluation process that weighs the chemical risks involved. In addition, a CAP will not lead directly to any immediate changes to the regulations.

The CAP itself is just a report that provides background information on a chemical and then lays out the steps that the EPA plans to take to address its concerns on that chemical. The background information typically includes a description of how the chemicals are utilized, whether by industries or by consumers, how much is used and expected changes in future usage of the material. The CAP also includes information on the known hazards to the environment or to human health, as well as the results of testing on laboratory animals. The report may also summarize information on the fate of the material when it enters the environment, as well as an analysis of the scope of the hazard from various sources (i.e. occupation exposures, consumer exposures, etc). The report may also describe current United States regulatory activities on a chosen chemical, as well as regulations within foreign countries or multi-national organizations. Finally, the report briefly summarizes the steps that the EPA anticipates taking in the future. This may include activities such as the collection of additional data, conducting additional studies, monitoring exposures or considering other regulatory actions.

Since the end of 2009, the EPA has released a total of ten Chemical Action Plans. One such plan was for the chemical Bisphenol A (BPA), a high production volume chemical that is widely used in the manufacture of plastics and epoxies. BPA is considered a potential reproductive and developmental toxin, and there were concerns about its use in the manufacture of products used by children. Another previously released plan was for various benzidine-based dyes. These dyes are widely used but some of them may be metabolized in the body to form aromatic amines that are potentially carcinogenic. The EPA is currently developing an action plan for siloxanes, a broad family of chemicals that are used in consumer products, and are also building-blocks for silicone compounds.

The most recently released CAPs were for the isocyanates MDI and TDI. Isocyanates are highly reactive compounds that, when mixed with other chemicals, undergo a 'curing' process that involves polymerization of the chemicals to form polyurethanes. These polyurethane polymers are used in a wide variety of applications, such as concrete sealants, floor finishing materials, and spray foam insulations. When these products are applied, most of the MDI or TDI is consumed in the resulting chemical reactions. But the way they are used makes it likely that there will be exposure to fumes from the chemicals when they are applied and also to 'uncured' residual isocyanates that can remain for some time after the polyurethane polymer forms.

While OSHA has regulated industrial exposure to these chemicals, the EPA was concerned about incidental exposure to these chemicals when they are used in consumer products or

when they are used in non-industrial settings that are not subject to OSHA regulations such as during 'do-it-yourself' home repairs and renovations where users do not receive chemical safety training. The action plan is not intended to apply to fully-cured polyurethane products where the raw materials have reacted completely, because these products are inert and non-toxic. The EPA is concerned because chronic exposure to the unreacted/uncured chemicals is known to cause severe skin and respiratory irritation, and has lead to asthma, as well as death in some extreme cases.

As for future actions, the CAP for MDI states that the EPA intends to collect additional data and will consider requiring additional exposure monitoring studies under TSCA Section 4. The EPA will consider TSCA section 6 rulemakings that could limit or prohibit the manufacture or use of consumer products containing uncured MDI. The CAP for TDI indicates that the EPA is considering future actions that are similar to those for MDI, but that they are also considering the designation of TDI and related compounds as a new use under the Significant New Use Rule (SNUR) of TSCA section 5(a)(2). The EPA plans to seek a voluntary phase-out of the use of TDI in consumer products, if a phase-out is deemed necessary.

The Department of Defense (DoD) uses a number of chemicals within the MDI and TDI chemical families that are cited in the MDI and TDI Chemical Action Plans. We reviewed the DoD's Hazardous Materials Information Resource System (HMIRS) to ascertain the level of Material Safety Data Sheet (MSDS) entry activity that occurred in calendar year (CY) 2010 with respect to one or more of the specific chemicals cited in the MDI or TDI CAP. HMIRS is DoD's MSDS and hazardous materials information repository for regulated materials as defined by FED STD 313, as well as OSHA's HAZCOM STD (29CFR1910.1200). During CY 2010, such records with MDI chemicals were created for 24 unique National Stock Numbers (NSN) and 22 Local Purchase Numbers (LSN). The vast majority of the MDI records fell in the Federal Stock Classes (FSC) 8030 (sealants) and 8040 (adhesives). There were fewer HMIRS records containing one or more of the TDI chemicals that were created during the same period, but those records applied to 12 unique NSNs and 13 LSNs with the plurality of the stock numbers having the FSC 8010 (paints & varnishes). These numbers do not account for records that were merely updated with a new contract number during that period of time, but it does indicate that several products procured by the military services may be affected by some of the regulatory actions proposed by these action plans.

While these Chemical Action Plans are not formal regulatory actions by the EPA, they do provide valuable information about the priorities for future EPA regulatory actions. Even though they do not describe current regulatory actions, they can provide a heads-up to the Military Services about chemicals that may be subject to additional scrutiny and regulatory action in the near future. The most recent CAPs were for chemicals found in several products procured by the DoD or GSA, and for siloxanes (in silicone products) that are also widely used by the military services. That being the case, it would be wise to pay attention to the action plans that have been issued and to be alert for those that will be issued in the future.

References:

1. "Chemical Action Plans", EPA Website, http://www.epa.gov/oppt/existingchemicals/pubs/ecactionpln.html

2. "EPA Announces Actions on Two Chemicals to Reduce Harm to People", Press Release, April 13, 2011, http://yosemite.epa.gov/opa/admpress.nsf/eeffe922a687433c85257359003f5340/b6930d85250395c185257871005ac462!OpenDocument

3. "Update on EPA's Recent and Forthcoming Chemical Action Plans Under TSCA", Mark Duvall & Alexandra Wyatt, Beveridge & Diamond, P.C., April 12, 2010, http://www.bdlaw.com/assets/attachments/Update on EPAs Recent and Forthcoming Chemical Action Plans Under TSCA.pdf

4. "EPA Releases First Chemical Action Plan", Sean Wajert, January 7, 2010, http://www.masstortdefense.com/2010/01/articles/epa-releases-first-chemical-action-plan/

5. "EPA Concerned With Two Consumer Chemicals", United Press International, April 13, 2011, http://www.upi.com/Science_News/2011/04/13/EPA-concerned-with-two-consumer-chemicals/UPI-47831302733493/

6. "EPA Releases MDI, TDI Action Plans to Protect Consumers", April 12, 2011, http://ohsonline.com/Articles/2011/04/16/EPA-Releases-MDI-TDI-Action-Plans-to-Protect-Consumers.aspx?p=1

GSA Adds Icons Identifying Environmentally Sustainable Products

By Philip Saunders, Chemical Engineer, HTIS

On October 5, 2009, President Obama signed Executive Order (EO) 13514 (Federal Leadership in Environmental, Energy, and Economic Performance). One of the key provisions of EO 13514 requires Federal agencies to ensure that, except for weapon systems, 95% of new purchases are environmentally friendly. In its catalogs and other publications, the General Services Administration (GSA) uses icons to aid in the search for and identification of products that comply with the requirements of the EO 13514. The information conveyed by these icons can aid Federal requisitioning activities, including those within the armed services and other Department of Defense agencies, in making an informed decision when choosing a product. Recently, the GSA announced that it was introducing several new icons and retiring others. This article describes the criteria that GSA used to assign the new icons and some explanations for why they are phasing out others.

The GSA introduced seven new icons as part of an effort to make the environmental icons more useful in identifying sustainable products. Some of the new icons replace old icons that were retired, while others are entirely new. The new icons

are already in use on the GSA Advantage (http://www.gsaadvantage.com) online catalog, but at the time of this writing, they were not yet in use on the GSA Global Supply (https://www.gsaglobalsupply.gsa.gov) catalog. When they are fully implemented, GSA's icon system will have the following additions and deletions:

NEW ICONS:

Biodegradable – This icon applies to materials that have been tested according to the Environmental Protection Agency's (EPA) Chemical Fate Testing regulations (40 CFR 796), and were found to be readily degradable under the conditions of the testing. The tests used for biodegradability simulate conditions found in nature, such as exposure to the sun (UV light), soil or water.

BioPreferred – This icon identifies products that are in compliance with the U.S. Department of Agriculture (USDA) and its Biopreferred program, which sets minimum requirements for biobased content for a variety of product categories (http://www.biopreferred.gov/ProposedAndFinalItemDesignations.aspx). The BioPreferred designation may be conferred on a product if it exceeds the USDA's Minimum Biobased Content (MBC) requirement for that product, but that minimum threshold can vary from 7% to 95%, depending on the category of the product. For example, the MBC for cloth towels is 12% but it is 90% for diesel fuel additives. The Federal Acquisition Regulations (FAR, Subpart 23.4) and Executive Orders 13423 and 13514 require that GSA customers purchase BioPreferred products when available.

EPA PMF – The Primary Metals Free (PMF) icon applies to products that are free of the three metals (cadmium, lead, mercury) that are identified on the EPA's list of 31 Priority Chemicals (http://www.epa.gov/waste/hazard/wastemin/priority.htm). This list consists of 31 chemicals and metals that were selected after a review of available scientific information determined that they were persistent, bioaccumulative and toxic. The EPA's Hazardous Waste Minimization Program issued this list to help focus its efforts to reduce the amount of the listed chemicals that are found in products (and eventually in wastes) by reducing their use in manufacturing processes.

FSC – This icon applies to products containing wood which was raised and/or harvested according to the Forest Stewardship Council's (FSC, http://www.fscus.org) principles, criteria and forest management standards. Some of the FSC principles include respecting the rights of indigenous people, minimization of environmental impact, and having written forest management plans.

GreenGuard - This icon is displayed on products that have been certified by GreenGuard (http://www.greenguard.org) to be a low-emission indoor product. To receive a GreenGuard certification, a product must undergo a series of testing to determine the amount of chemical emissions from that product under various circumstances. It will only receive the certification if the emissions of any hazardous chemical are such that the measured air concentrations of those chemicals are less than the specified risk-based thresholds for both chronic and acute exposures.

Low VOC – This icon may be used when the product meets the volatile organic compound (VOC) emission limits for that product as established by the California Air Resources Board (CARB). The CARB VOC standard lists the maximum weight percent of VOC that a product may contain and still be compliant. The maximum allowed VOC content is specified for product categories and can range from 2% (for non-aerosol tire/wheel cleaners) to 80% (for aerosol anti-static products).

WaterSense – WaterSense is a voluntary program, similar to the Energy Star program, which was launched by the EPA in 2006 with the goal of encouraging the purchase and use of water efficient products and services. Products that meet the specifications and standards established by this program may bear the WaterSense label on which this icon is modeled. Currently, the specifications that have been developed for this program apply mostly to plumbing fixtures such as shower heads, toilets and sink faucets, but in the future it may also apply to landscaping and irrigation equipment as well as industrial processes.

RETIRED / REPLACED ICONS:

NEW RETIRED

Comprehensive Procurement Guideline (CPG) Compliant – In this case, the category of products that this icon identified will remain active and its definition unchanged, but its icon has been replaced by the traditional 'recycling' logo that was previously used to identify products meeting the requirements of the Recycled Content classification that is being retired (see below). The CPG values are set by the EPA and specify the required percentage of total recovered materials contained in products, though for some materials the minimum amount of postconsumer content may also be specified. While there was no publicized reasoning for this change, the GSA decided to reassign the old icon for Recycled Content to this category of products because the "chasing arrows" logo is widely known, while the meaning of the letters 'CPG' are familiar to only a few.

Recycled Content – This icon previously identified products that contained recycled material, but has been reassigned to the CPG Compliant category of products. The distinction between this category and the CPG category is that Recycled Content did not have a lower limit for the amount of recycled content (other than being greater than zero). This category was retired because agencies are required to purchase CPG compliant products (if available) and any product that was CPG compliant would also meet the requirement for the Recycled Content classification. That being the case, GSA decided that it needed to have just one icon to identify products containing recycled materials and that the CPG classification was the most useful.

Biobased – This icon was used to identify products that contained biobased material. This category of products is being replaced by the new BioPreferred category and its icon (see pg. 8) because the requirement for the Biobased classification was duplicative for those products that were also classified as BioPreferred. The requirements for the Biobased classification were also less strict than those for BioPreferred products, since it could be assigned to products that did not necessarily exceed the USDA's minimum requirements for the BioPreferred classification.

CA South Coast Air Quality Management District (SCAQMD) – This icon was retired and replaced with the Low VOC icon because products that were certified to meet the SCAQMD standard also met the standards of the CARB VOC standard. In addition, the meaning of this icon was not particularly obvious to the casual user who was not familiar with what the SCAQMD acronym. On the other hand, the essential meaning of the 'Low VOC' icon is immediately obvious.

Environmentally Friendly – This icon is being retired along with the associated category, because the environmental properties embodied by this category are redundant and more effectively reflected by other icons, such as those for the new 'Low VOC', the 'Biodegradable', and the 'EPA PMF' product classifications. The category itself was likely deemed too broad and vague to be useful, since it did not convey to the user what made a product friendly to the environment. Also, the icon itself was ambiguous and its meaning was not obvious to a casual user.

Non-Toxic Items – This icon is being retired along with the 'non-toxic' category because there was no specific definition for 'non-toxic' and the term is so broad that it was not providing useful information. This was likely deemed as too vague because the toxicity of a product can depend on multiple factors such as the dose (anything in sufficient quantity can be toxic), the route of entry (ingestion, inhalation, etc.) and the duration or frequency of exposure (chronic or acute). As with the 'Environmentally Friendly' classification, GSA decided that the essential properties conveyed by this category were more effectively covered by the icons for other classifications that address specific characteristics of toxic chemicals.

EPA Environmental Technology Verification (ETV) – The EPA's ETV program (http://www.epa.gov/etv) was established for companies to voluntarily verify that their environmental technologies perform to certain standards in order to aid in the decision-making process when adopting a new environmental technology. Pre-determined standards and test protocols are developed by the ETV program with the assistance of stakeholders and other experts. The GSA decided to retire this icon because there is no Federal requirement that mandates the purchase of products that have been tested and meet the ETV program's standards.

In addition to the seven new icons and the reassignment of the icon for recycled materials, there are nine additional icons that are used and are not affected by these changes. These include the NESHAP (National Emission Standards for Hazardous Air Pollution) icon for materials that are free of toxic air pollutants, the PRIME (the Navy's Plastics Removal in Marine Environment Program) icon for products that are packaged in biodegradable materials, and others dealing with energy efficiency, ozone-depleting substances, and for environmentally preferable electronic devices.

The intent of the changes to these icons was to make them more informative to people who are searching for products in the GSA catalogs. The new icons meanings are also more intuitive and have more specific or stringent definitions than those they replaced. Since all Federal agencies are required to make 95% of their purchases be environmentally preferable and sustainable products, it would be wise for all procurement activities to become familiar with the icons that GSA is using to identify products that meet this requirement.

References:

1. "Modernization of Federal Acquisition Service's Environmental Symbols", GSA Federal Acquisition Services, https://vsc.gsa.gov/Sustainable Icon Revision.pdf

2. "Meet the Icons", GSA MarkeTips Magazine, Volume 24, Number 2, March/April 2011, https://apps.fas.gsa.gov/cmls/viewpdf.cfm?47595D4441545E0E48554B15575D675D5342055B454448400B1F175A5F435147541E5E52421E5F40501E5F5C471F5B5E5D43675A5F435147541F4857571F0D1E0001150301010B011F405C55

3. "Executive Order 13514", US Department of Energy, Federal Energy Management Program, http://www1.eere.energy.gov/femp/regulations/eo13514.html

— Icon images are courtesy of GSA.

Current Intelligence Bulletin on Occupational Exposure to Titanium Dioxide

By Beverly Howell, Industrial Hygienist, HTIS

Current Intelligence Bulletins (CIBs) are issued by the National Institute for Occupational Safety and Health (NIOSH) to disseminate new scientific information concerning occupational hazards. A CIB may draw attention to a formerly unrecognized hazard, report new data on a known hazard, or disseminate information about hazard control. CIBs are distributed to representatives of academia, industry, organized labor, public health agencies, and public interest groups as well as to federal agencies responsible for ensuring the safety and health of workers.

In April 2011, NIOSH released "Current Intelligence Bulletin 63: Occupational Exposure to Titanium Dioxide", that is based on assessments of currently available scientific information about this widely used material. This document also marks the first time NIOSH has released two separate guidelines in a single document for the same chemical based on particle size.

Titanium dioxide (TiO_2) is a multifaceted compound. Characteristically, it is noncombustible, white, crystalline, solid, and odorless powder. It is the ingredient that makes toothpaste white, paint opaque, and it allows sunscreens to block ultraviolet light. The main use of TiO_2 is as a white powder pigment, meaning that at relatively low levels, the pigment can achieve a white opaque coating. One of the major advantages for using titanium dioxide is its resistance to discoloration when exposed to ultraviolet (UV) light. It is also a potent photocatalyst that can break down almost any organic compound. Some companies are seeking to capitalize on TiO_2's reactivity by developing a wide range of environmentally beneficial products, such as self-cleaning fabrics, auto body finishes, ceramic tiles and antibacterial applications.

The Department of Defense uses or purchases products such as paints and coatings, including glazes and enamels, plastics, paper, inks, fibers, foods, pharmaceuticals and cosmetics that contain TiO_2. A search for TiO_2 by its Chemical Abstract Services (CAS) Registry Number, 13463-67-7, in the Hazardous Materials Information Resource System (HMIRS) revealed several National Stock Number assets in Federal Stock Classes 8010, 8040 and 9150, where TiO_2 is listed as a component.

The TiO2 CIB:

- Reviews the animal and human data relevant to assessing the carcinogenicity and other adverse health effects of TiO_2;
- Provides a quantitative risk assessment using dose-response information from the rat and human lung dosimetry modeling and recommended occupational exposure limits for fine and ultrafine (including engineered nanoscale) TiO_2; and,
- Describes exposure monitoring techniques, exposure control strategies, and research needs. This report only addresses occupational exposures by inhalation, and conclusions derived here should not be inferred to pertain to nonoccupational exposures.

NIOSH initiated the evaluation of titanium dioxide by considering it as a single substance with no distinction regarding particle size. However, a review of all the relevant scientific literature indicates that there could be a greater occupational health risk with smaller size (ultrafine) particles and therefore **NIOSH provides separate recommendations for the ultrafine and fine categories**.

The occupational exposure to TiO_2 as regulated by the Occupational Safety and Health Administration (OSHA) under the permissible exposure limit (PEL) is 15 mg/m^3 for TiO_2 as total dust (8-hr time-weighted average [TWA] concentration) [29 CFR* 1910.1000; Table Z–1]. The OSHA PEL for particles not otherwise regulated (PNOR) is 5 mg/m3 as respirable dust [29 CFR 1910.1000; Table Z–1]. These and other exposure limits for TiO_2 and PNOR or particles not otherwise specified (PNOS) are listed in Table 1 of 29 CFR 1910.1000. PNOR/S are defined as all inert or nuisance dusts, whether mineral, inorganic or organic, not regulated specifically by substance name by OSHA (PNOR) or classified by the American Conference of Governmental Industrial Hygienists (ACGIH)(PNOS).

NIOSH recommends airborne exposure limits of **2.4 mg/m^3 for fine TiO_2** and **0.3 mg/m^3 for ultrafine** (including engineered nanoscale) TiO_2 as TWA concentrations for up to 10 hr/day during a 40-hour work week, using the international definitions of respirable dust, and the NIOSH Method 0600 for sampling airborne respirable particles.

So why is a lower exposure limit recommended? These lower exposure limits are recommended because they represent levels that, over a working lifetime, are estimated to reduce risks of lung cancer to below 1 in 1,000, to assure safe and healthful working conditions for every working person, and to preserve our human resources.

To view the complete publication, go to http://www.cdc.gov/niosh/docs/2011-160/

Reference:

Department of Heal and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Current Intelligence Bulletin 63, " Occupational Exposure to Titanium Dioxide, April, 2011 , DHHS (NIOSH) Publication No. 2011–160.

Control Heat Injuries with Water, Rest and Shade

By Beverly Howell, Industrial Hygienist, HTIS

"Heat-related injuries are significant threats to the health and operational effectiveness of military members and their units. Although numerous and effective countermeasures are available, physical exertion in hot environments still causes hundreds of injuries, some life threatening, among U.S. military members each year. In 2010, there were 311 incident cases of 'heat stroke' and 2, 576 incident cases of 'other heat injury' among active component members." The active component surveillance populations include all individuals of the Army, Navy, Air Force, Marine Corps, and Coast Guard. Working in hot environments for long periods of time can have detrimental effects on military as well as civilian workers. During the summer months of 2010, the U.S. was hammered with severe heat waves that impacted working conditions in most states.

Heat kills by pushing the human body beyond its limits to physiologically regulate the body's temperature. In extreme heat and high humidity, evaporation is slowed and the body must work harder to maintain a normal temperature. Most heat disorders occur because the victim has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children, and those who are sick or overweight are more likely to succumb to extreme heat.

Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, a condition that can produce higher nighttime temperatures known as the "urban heat island effect."

The Occupational Safety and Health Administration initiated a campaign focusing on preventing heat illness in outdoor workers. Whether military or civilian the strategies to protect one's self from the onset of heat illness remain the same.

Preventing Heat Illness

The best way to prevent heat illness is to make the work environment cooler. The following recommendations for preventing heat illness are for all work environments (Indoors and Outdoors):

- Train workers and supervisors about the hazards leading to heat illness and ways to prevent them.
- Train workers to recognize heat illness related symptoms (e.g. heat cramps, exhaustion, or stroke) in themselves and others.
- Train and encourage workers to immediately report heat illness symptoms in themselves and others.
- If someone is new to the job or has been away for more than a week, gradually increase the workload or allow that worker more frequent breaks during the first week.
- Provide workers with plenty of cool water in convenient, visible locations close to the work area. Water should have a palatable (pleasant and odor-free) taste and water temperature should be 50-60 F if possible.
- Remind workers to frequently drink small amounts of water before they become thirsty to maintain good hydration. Simply telling them to drink plenty of fluids is not sufficient. During moderate activity, in moderately hot conditions, workers should drink about 1 cup every 15 to 20 minutes. Instruct workers that urine should be clear or lightly colored.
- Workers should eat regular meals and snacks that provide enough salt and electrolytes to replace those lost through sweating as long as enough water is consumed. Electrolyte drinks, e.g., Gatorade®, are usually not necessary.
- Set up a buddy system if possible; if not, check routinely (several times an hour) to be sure that workers are making use of water and shade and not experiencing heat-related symptoms.
- Make workers aware that it is harmful to drink extreme amounts of water. Workers should generally not drink more than 12 quarts (48 cups) in a 24 hour period. If higher amounts of fluid replacement are needed due to prolonged work in high heat conditions, a more comprehensive heat illness prevention program may be warranted.
- Reduce the physical demands of the job. If heavy job tasks cannot be avoided, change work/rest cycles to increase the amount of rest time.
- Schedule frequent rest periods with water breaks in shaded or air-conditioned recovery areas. Note that air conditioning will NOT result in loss of heat tolerance and is recommended for rest breaks.

Additional Recommendations for Outdoor Work Environments

- Monitor weather daily and reschedule jobs with high heat exposure for the cooler periods of the day.
- Be extra vigilant during heat waves when air temperatures rise above normal.
- When possible, schedule routine maintenance and repair projects for the cooler seasons of the year.

Remember: HEAT ILLNESS CAN BE DEADLY; however, these illnesses and deaths are preventable.

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1. Armed Forces Health Surveillance Center Medical Surveillance Monthly Report, Vol. 18, No. 03. March 2011.

2. OSHA-NIOSH Info Sheet, Protecting Workers from Heat Illness, DHHS (NIOSH) 2011-174/OSHA 3438-5-11.

3. OSHA website- http://www.osha.gov/SLTC/heatillness/index.html

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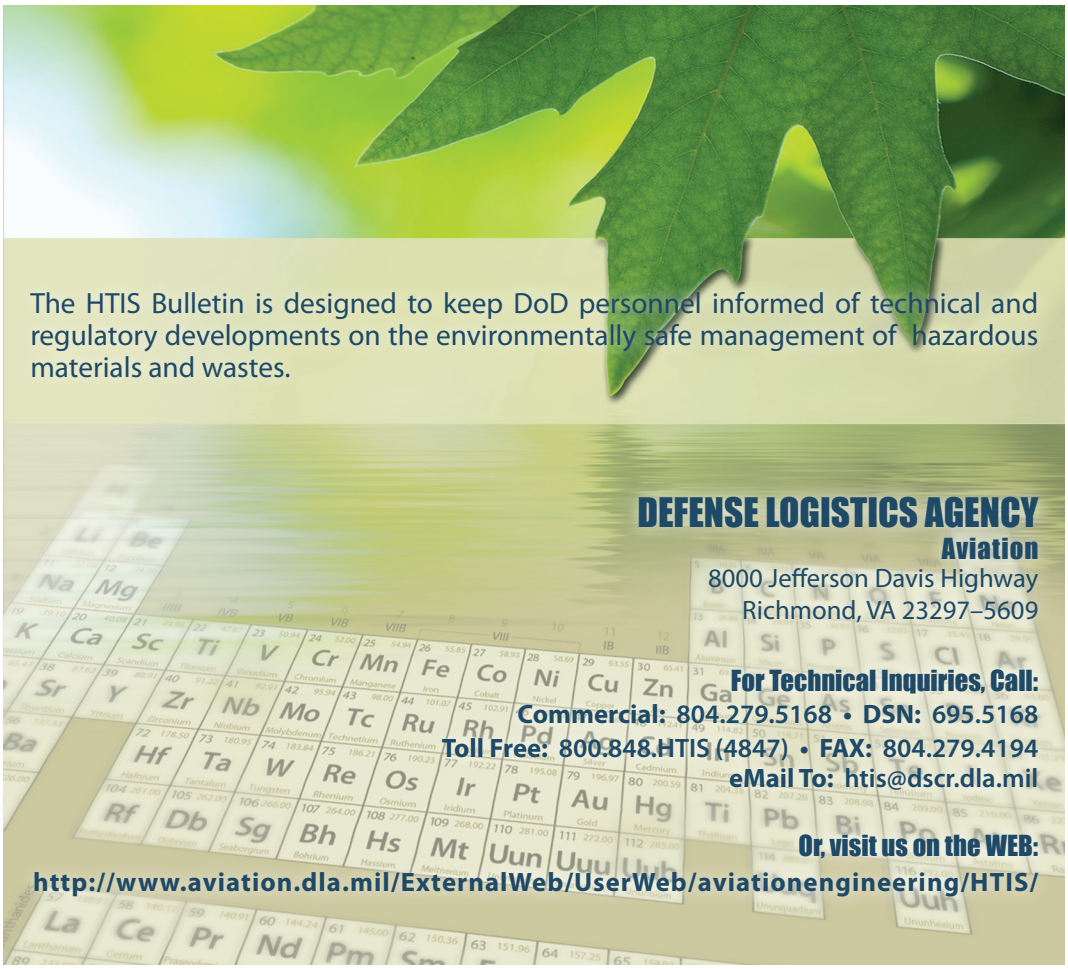
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