From the
Chemical & Material Risk Management Program
Office of the Under Secretary of Defense for Acquisition, Technology & Logistics

Chemical & Material Emerging Risk Alert

Phthalates

In response to regulatory pressures and resulting market changes, some phthalates are being phased-out of production. Unique defense or mission-critical phthalates, or products containing phthalates, may not be available.

What are phthalates?

Phthalates (‘tha-lāts), or phthalate esters, are a family of organic compounds. They are high production volume chemicals, the majority of which are manufactured for use as plasticizers in polyvinyl chloride (PVC) and other polymers. The binding of phthalates within the polymer matrix results in flexible and durable end products.

These products are found in almost all major commercial and consumer industries (e.g., construction, automotive, medicine, and household goods). Phthalate-containing products include, but are not limited to: vinyl flooring and sheeting, wire coverings, paints and lacquers, intravenous tubing and blood bags, and cosmetic and toiletry formulations.

How are phthalates used in the DoD?

Phthalates are used as non-energetic plasticizers in solid gun propellants, including single-, double-, and triple-base propellant compositions. The plasticizers improve the processibility and flexibility of the propellant slurry and mechanical properties of the cured propellant. The use of phthalates as plasticizers in propellants is unique to the DoD.

Phthalates may also be used as solvents and plasticizers in mission critical and unique chemical, biological, radiological, or nuclear (CBRN) defense equipment. The phthalates in CBRN equipment would be used for similar reasons as commercial and consumer products (i.e., to impart flexibility and durability), however with mission critical function. For example, high-performance military fabrics made of flexible vinyl may be used in collective protection soft-wall structures or liners and barriers. In addition, individual protective equipment may comprise phthalate-containing gaskets or liners used in gloves, suits, or respirators.

What are the health and environmental concerns?

Exposure to phthalates has been associated with adverse effects on the development of the reproductive system of male laboratory animals. However, phthalates differ in the severity of their effects, and some phthalates are not associated with adverse health effects. Ongoing scientific research focuses on the possible association between phthalate exposures and adverse impacts on human health and the environment. Recent studies show widespread human exposure to multiple phthalates.

The U.S. Environmental Protection Agency (EPA) is currently assessing the human health risks associated with single and cumulative exposure to phthalates as part of their Integrated Risk Information System (IRIS) substance assessments.

How are phthalates regulated?

In the U.S., phthalates are regulated under multiple environmental, human health, and occupational and consumer safety laws at the state and Federal levels. These public health laws focus on specific phthalates.

For example, the U.S. Consumer Product Safety Improvement Act of 2008 prohibits the manufacture, import, distribution, or sale of children’s toys or child care articles containing more than 0.1% of six different phthalates.

The U.S. EPA regulates phthalates under the Clean Air Act (CAA), Clean Water Act (CWA), the Toxic Substances Control Act (TSCA), and several others. In addition, it is taking action to more fully assess the use, exposure, and substitutes for phthalates.

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The European Union's (EU) regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) identifies several phthalates as substances of very high concern (SVHC) and classifies them as toxic to reproduction. Of these, four are now subject to authorization and, unless an authorization has been granted for a specific use, these substances cannot be produced or used in the EU after their sunset date of February 2015.

What is the emerging risk?

The availability of low-cost feedstock and consumer demand for safe products affect market supply. In response to economic and regulatory drivers, some phthalate producers have phased-out production or decreased production of some phthalates. As a result, material availability may be impacted; unique or mission critical phthalates, or products containing phthalates, may not be available.

In addition, some producers are making plastics that do not need phthalates to be flexible, and alternatives to phthalates are beginning to be manufactured. Integrating alternatives into the defense supply chain may be challenging due to the test and evaluation requirements for requalification of materials and products. These alternatives may or may not meet defense performance requirements.

What should you do in response to this Alert?

Phthalates as a group of chemicals have been elevated to the DoD's Emerging Contaminants Action List. The phthalates of concern are listed in Table 1.

To ensure material availability now and in the future, please notify the Chemical and Material Risk Management staff of unique or mission critical uses of these phthalates in the DoD. Help us identify the purpose of phthalates in unique or critical uses and any military-specific criteria requiring their use. Also, please provide any information you have on suppliers of unique or mission critical phthalate-containing equipment.

Table 1. DoD Action List Phthalates

Chemical Abstract Service Registry Number	Common Name	Acronym
131-11-3	Dimethyl phthalate	DMP
84-66-2	Diethyl phthalate	DEP
84-74-2	Dibutyl phthalate	DBP
84-69-5	Diisobutyl phthalate	DIBP
85-68-7	Butyl benzyl phthalate	BBP
131-18-0	Di-*n*-pentyl phthalate	DnPP
117-84-0	Di-*n*-octyl phthalate	DnOP or DOP
117-81-7	Di (2-ethylhexyl) phthalate	DEHP
28553-12-0 68515-48-0	Diisononyl phthalate Di-(C9-rich branched C8-C10-alkyl) phthalate	DINP
26761-40-0 68515-49-1	Diisodecyl phthalate Di-(C10-rich branched C9-C11-alkyl) phthalate	DIDP

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