DIISOPROPYL METHYLPHOSPHONATE

($C_7H_{17}O_3P$) CAS #1445-75-6 (Semi-Volatile Organic Compound)
Synonyms include: DIMP, Diisopropyl methanephosphonate
Phosphonic acid, methyl-, bis(1-methylethyl) ester
Phosphonic acid, and diisopropyl ester

SOURCE/USE

Diisopropyl methyphosphonate (DIMP) does not occur naturally in the environment and is a by-product of the manufacture of Sarin (GB). The U.S. Army produced and stored Sarin at the Rocky Mountain Arsenal in the 1950s. Human exposure to DIMP is confined to sites where Sarin was produced, used, or disposed.

ROUTES OF EXPOSURE

DIMP exposure can occur via many potential pathways. These pathways include oral, dermal and pulmonary routes of exposure. The risk of any acute DIMP exposure off post due to the RMA soil remediation activity is very small because DIMP is a contaminant of concern only in groundwater. Also, alternative domestic water has been provided for off-post households affected by DIMP-contaminated groundwater.

APPLICABLE STANDARDS AND LIMITS	
ATSDR MRL	Not Available
OSHA PEL	Not Available
Odor recognition	No Odor
Colorado groundwater standard	8 µg/l
EPA federal drinking water advisory	600 µg/l
RMA acute fence line criteria*	Not Available
RMA chronic fence line criteria*	Not Available

***** Fence line criteria were not calculated for this chemical as it is not a concern from soil remediation activities.

The goal of the remediation is exposure prevention through remedial design, environmental monitoring, and modeling. Failure of prevention could result in acute and/or chronic exposures. Following is an overview of the types of health effects associated with DIMP exposure.

ACUTE HEALTH EFFECTS

Acute toxic effects of DIMP in various animal species are largely related to the effects of this organophosphorus compound on the central nervous system. These effects range from ataxia and decreased activity to coma followed by death at the higher doses.

Limited data in various animal species reveal hyperemia of the lungs, pulmonary emphysema, and lower lung weights.

Eye irritation tests in animal species display significant temporary irritation of the conjunctiva with moderate to severe redness and moderate corneal opacity.

Animal and human dermal toxicity studies demonstrate skin irritation. Death of rabbits within 24 hours of high dose dermal application indicates systemic toxicity.

Hematological studies in animal species reveal a significant and dose related effect on the coagulation system. Other effects include depressed hematocrits and a lower percentage of lymphocytes.

Acute gastroenteritis, ecchymotic hemorrhaging upon necropsy and esophageal edema are seen in cattle. Rats treated with DIMP showed induction of liver enzymes. A study of juvenile mink show a significant decrease in liver weight.

In a study of calves, animals receiving higher dose level displayed mild congestion of the renal cortex. Significant decrease in kidney weight are observed in mink that had ingested DIMP.

CHRONIC HEALTH EFFECTS

DIMP has a variety of toxic effects in various animal species. Limited animal data provided evidence for DIMP-related effects after oral exposure which include inhibition of plasma and blood acetylcholinesterase, damage to red blood cells as measured by Heinz body formation and other associated changes, kidney dysfunction as measured by increased blood urea nitrogen, some organ weight changes, changes in coagulation system, and body weight changes. DIMP has also been associated with death of pregnant and lactating mink. Some reproductive/developmental effects were noted in mice and rats, but the available data are inadequate to draw firm conclusions.

Lifetime and carcinogenic studies are not available. There is inconclusive evidence for the weak mutagenic potential of DIMP.