

Laura Olah

From: Kenney, Joan M CIV (US) <joan.m.kenney.civ@mail.mil>
Sent: Thursday, January 09, 2014 11:49 AM
To: Myers, Will M - DNR
Cc: Sitton, Robert M CIV (US)
Subject: Degredation of Minor DNT Isomers
Attachments: USAMRDC Rat Assay (DNT info) Nov 1985.pdf; Technology Review-Bioremediation of DNT (Spain) 2001.pdf; MIRM EW-163 analysis June 1997.pdf

Hi Woody,

My personal input to add to Joel's info below.

At Badger, since construction we were evaluating the groundwater capture of the MIRM by tracking 2,3-, 2,4- and 2,6-DNT because the 2,3- was more persistent and could be used as an indicator within the entire PBG plume whereas the 2,4- and 2,6- were only being detected in the source area. I've attached a page from EW-163 analytical - note the LODs then.

Joan

From: Debra K. Fawcett [Debra.Fawcett@specpro-inc.com]
Sent: Thursday, January 09, 2014 9:26 AM
To: Sitton, Robert M CIV (US)
Cc: Davis, Delbert A CTR (US); Ruenger, Clair E CTR (US); Janssen, Joel L CTR (US); Badger Admin
Subject: Request from Mike Sitton re: Minor DNT Isomers

Mike, from Joel:

Mike asked me to prepare an email to Woody Myers that provided documentation & references regarding the minor isomers of DNT and their degradation potential. Please review and forward on for approval.

Mike Sitton asked BTS, LLC to provide documentation & references regarding the minor isomers (2,3-, 2,5-, 3,4-, 3,5) of DNT and their degradation potential.

I could not find a lot of research and data related to the degradation potential of these minor DNT isomers. Extensive research has been conducted on the biological/chemical degradation of 2,4 & 2,6-DNT.

Mike Conry, BTS lab manager, provided the following information. Other DNT isomers will not behave the same as 2,4-DNT due to the geometry of the isomers. The two nitro groups on the 2,3-DNT and 3,4-DNT isomers are in close proximity to each other and limit degradation. The nitro groups on the 2,4-DNT and 2,6-DNT isomers are farther apart and do not limit degradation. Our experience has been that 2,3-DNT and 3,4-DNT appear to degrade very little.

Reference #1

"Nishino, S.F., Spain, J.C., 2001. Technology Status Review: Bioremediation of Dinitrotoluene (DNT). Air Force Research Laboratory. Tyndall AFB, Florida. February."

This document (attached) mentions 2,3-DNT biodegradation.

This document references the Badger Army Ammunition Plant soils. Nishino & Spain state on page 3, "2,3-DNT does not decrease at the same rate as 2,4- and 2,6-DNT. 2,3-DNT has not been demonstrated to be biodegradable and can thus be considered a conservative tracer that reflects the effect of abiotic processes." Abiotic processes are chemically-based reductions that do not utilize microbes to break down compounds.

Reference #2

"Spanggord RJ, Myers CJ, LeValley SE, Green CE, Tyson CA, 1985. Development of a Theoretical Model to Assess the Hepatocarcinogenic Potential of Chemicals Using Structure-Activity Relationships and the Rat Hepatocyte Assay. U.S. Army Medical Research and Development Command. November."

This rat study (attached) by the USAMRDC discusses the metabolites of each DNT isomer but does not directly discuss the degradation potential of each DNT isomer. Metabolites are the product of metabolism or formed by a biochemical process.

Page 18 and 25 discuss the metabolites of each DNT isomer. These metabolites are the same DNT degradation compounds the Army has been monitoring at both the PBG and DBG source area monitoring wells.

Joel Janssen

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