

SUPERFUND

W. R. Grace (Acton Plant) Site, Acton, MA

U.S. EPA | HAZARDOUS WASTE PROGRAM AT EPA NEW ENGLAND



THE SUPERFUND PROGRAM protects human health and the environment by investigating and cleaning up often-abandoned hazardous waste sites and engaging communities throughout the process. Many of these sites are complex and need long-term cleanup actions. Those responsible for contamination are held liable for cleanup costs. EPA strives to return previously contaminated land and groundwater to productive use.

SITE DESCRIPTION AND BACKGROUND:

The purpose of this fact sheet is to answer questions for residents about 1,4 dioxane, which is a contaminant that was found at the W.R. Grace Site. 1,4-dioxane is an industrial solvent that was first detected in groundwater at the W.R. Grace Site in 2006. Since that time, the Environmental Protection Agency (EPA) and Massachusetts Department of Environmental Protection (MassDEP) have required Grace to monitor for it. It should be noted that the 1,4-dioxane levels found do not exceed EPA's acceptable risk range. In addition, the Acton Water District (AWD) is also testing and monitoring the School Street and Assabet public water supply wells for 1,4-dioxane. The average results thus far show that the 1,4-dioxane levels do not exceed the MassDEP safe drinking water guideline of 0.3 parts per billion (ppb). This fact sheet explains this below in more detail.

The W. R. Grace (Acton Plant) Superfund Site is located in the Towns of Acton and Concord, Massachusetts and has been used for industrial purposes since the 1800's. The W. R. Grace property is composed of approximately 260 acres of land including several surface water bodies and various wetlands.

W. R. Grace acquired the property in 1954, and operations at the W. R. Grace facility included the production of materials used to make concrete and organic chemicals, container sealing compounds, latex products, and paper and plastic battery separators. Wastewater and solid industrial wastes from these operations were disposed of in several unlined lagoons and were buried in a former on-site Industrial Landfill. All manufacturing ceased at the Grace Site in 1991.

WHAT IS 1,4-DIOXANE?

1,4-dioxane is a clear liquid that easily dissolves and moves quickly in water. Once dissolved into water, it does not easily leave the water and enter into air. It is used primarily as a solvent in the manufacture of chemicals; as a laboratory reagent; and as a stabilizer and an adhesive. 1,4-dioxane may also be present in trace amounts in cosmetics, detergents,

and shampoos. Government agencies believe that 1,4-dioxane is likely to be carcinogenic to humans.

WHAT DOES CANCER RISK MEAN?

Cancer risk is the "incremental" or additional proportion of the population that may be affected by a carcinogenic substance over a lifetime. In other words, an estimated cancer risk of 1 in a million (1 in 1,000,000) would mean that there is a probability of one additional cancer over background levels in a population of one million people. The term "incremental" refers to risks above the background cancer risk experienced by all individuals in the course of daily life. EPA generally takes action at a Site where the incremental cancer risk is greater than 1 in 10,000. EPA takes into account site-specific factors when determining the need for a cleanup action. For example, EPA might take into account site-specific evidence that aquatic organisms are being harmed by groundwater discharging to surface water in deciding whether cleanup action for groundwater is needed. EPA also takes into account uncertainties with the risk estimate when determining the need for a cleanup action. For example, EPA might take into account the uncertainty in estimating exposure through showering and bathing in deciding whether cleanup action is needed.

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www.epa.gov/ne/superfund/sites/graceacton

HAS 1,4-DIOXANE BEEN DETECTED AT THE W. R. GRACE SUPERFUND SITE? (SEE ATTACHED FIGURE)

Yes, according to the 2010 annual groundwater report, 1,4-dioxane has been detected at the W. R. Grace Superfund Site. The 1,4-dioxane concentrations detected most recently in the Northeast Area range from a low of 0.11 parts per billion (ppb) to a high of 2.1 ppb. Located on the southeast portion of the Grace property, in groundwater flowing away from the former Industrial Landfill, 1,4-dioxane concentrations have ranged historically from a low of 1.5 ppb to a high of 36 ppb. Note that 1,4-dioxane in the Northeast Area has migrated beyond the W.R. Grace property line, see attached figure.

HOW FREQUENTLY IS 1,4-DIOXANE SAMPLED FOR AND ARE THE ACTON WATER DISTRICT WELLS SAMPLED FOR 1,4-DIOXANE?

W.R. Grace collects samples from numerous groundwater monitoring wells throughout the Site annually. Grace also collects water samples at the effluent discharge for the Northeast Area and the Landfill Area groundwater treatment systems on a monthly basis and analyzes them for 1,4-dioxane, volatile organic compounds (VOCs) and metals. Also, since 2007, the Acton Water District periodically samples for the presence of 1,4-dioxane in the Assabet and School Street Wellfields.

The most recent sampling of the Acton Water District wells was performed during September 2011. Untreated raw water from the School Street and Assabet wells was sampled for 1,4-dioxane using EPA drinking water method 522. After combining duplicate results by averaging, as recommended by both MassDEP and EPA, all results were below the MassDEP drinking water guideline of 0.3 ppb.

DOES THE ENVIRONMENTAL PROTECTION AGENCY (EPA) HAVE AN ENFORCEABLE DRINKING WATER STANDARD FOR 1,4-DIOXANE?

No. Currently, EPA has not set an enforceable drinking water standard for 1,4-dioxane. Enforceable Federal drinking water standards are called Maximum Contaminant Levels or MCLs. However, EPA has developed a non-site specific Federal guideline for 1,4-dioxane of 0.67 ppb, calculated using a cancer toxicity value developed by EPA in 2010. The levels found at the School Street and Assabet wells are below this non-site specific Federal guideline. Additional information on how EPA evaluates potential risk and how EPA defines "acceptable risk" is provided below.

DOES THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (MASSDEP) HAVE AN ENFORCEABLE DRINKING WATER STANDARD FOR 1,4-DIOXANE?

No. Currently, MassDEP has not set an enforceable drinking water standard for 1,4-dioxane. Enforceable State drinking water standards are called Massachusetts Maximum Contaminant Levels or MMCLs. However, MassDEP has established a state drinking water guideline of 0.3 ppb, based on cancer risk and EPA's cancer toxicity value, for consumption of drinking water.

WHY DO EPA AND MASSDEP HAVE DIFFERENT GUIDELINES FOR 1,4-DIOXANE?

MassDEP and EPA guidelines for 1,4-dioxane were developed for different purposes and each agency uses different assumptions when calculating the respective guidelines. MassDEP developed their 0.3 ppb guideline to protect people who might be exposed to 1,4-dioxane from drinking contaminated water. For purposes of this guideline, MassDEP assumes a person would drink 2 liters of contaminated water per day over a 70 year lifetime.

EPA used its 1,4-dioxane guideline to determine if there is an unacceptable risk to a person who may be exposed to contamination from being on the Site. EPA assumes a person would drink contaminated water over a 30 year lifetime, including 1 liter of water per day for a young child and 2 liters of water per day for an older child or adult. Unacceptable risks may trigger

EPA to require additional regulatory evaluation and/or clean up actions.

EPA evaluated the concentrations of 1,4-dioxane and compared them to the EPA guideline and determined that there are no unacceptable risks to humans from the presence of 1,4-dioxane at the Site.

WHY ARE MASSDEP'S DRINKING WATER GUIDELINES NOT ENFORCEABLE?

"Enforceable standards" are those that have been formally promulgated in regulations. EPA's Maximum Contaminant Levels (MCLs) and Massachusetts Maximum Contaminant Levels (MMCLs) are the promulgated federal and state standards, respectively.

MassDEP's drinking water guidelines are recommended levels developed by MassDEP's Office of Research and Standards (ORS) for contaminants that do not have established MCLs/MMCLs. These guidelines have not been promulgated in regulations.

HOW ARE MASSDEP DRINKING WATER GUIDELINES DEVELOPED?

The MassDEP Drinking Water Program (DWP) evaluates all drinking water sample results against enforceable Federal and State standards (MCLs and MMCLs), or against guidelines created by EPA or MassDEP Office of Research and Standards when no Federal or State MCL is available.

However, Federal or State MCLs have not been established for some contaminants that are required to be tested under the Safe Drinking Water Act (SDWA). As a result, MassDEP Office of Research and Standards has developed guidelines (or ORSGs) for these contaminants.

These guidelines, or ORSGs, are established using risk assessment methods consistent with those used by EPA's Office of Water when setting guidelines for chemicals in drinking water. ORSGs are developed using EPA's toxicity information, when available, and assume that an adult ingests 2 liters per day of contaminated water throughout a 70-year lifetime. When there is no toxicity information available, information is sought from scientific literature to support derivation of guidelines.

In order to limit exposure to concentrations of carcinogenic chemicals as much as possible, ORSGs for these chemicals are set at an excess lifetime cancer risk (ELCR) of one in one million (1 in 1,000,000), or at the lowest practical quantitation limit (PQL).

ORSGs are not derived for a specific site or exposure scenario but are guidelines to local water supplies and the general public. A description of the process used to derive these values can be found in the Guide to the Regulation of Toxic Chemicals in Massachusetts Waters. Questions regarding the MassDEP guideline for 1,4-dioxane should be directed to Diane Manganaro in ORS at 617-556-1158.

HOW HAS EPA CALCULATED THE POTENTIAL CANCER RISK OF 1,4-DIOXANE AT THE GRACE SITE?

EPA has conducted a site-specific assessment of the cancer risk from 1,4-dioxane at the Grace site. EPA used very conservative site-specific exposure estimates. In this instance, EPA assumed that an individual would drink contaminated water from the same source over a 30-year period including 6 years as a young child and 24 years as an older child or adult. EPA also assumed that a young child would drink 1 liter of water per day and an older child or adult would drink 2 liters of water per day. The concentration of 1,4-dioxane in residential drinking water over this 30-year period was assumed to be equal to the highest concentration found at the Site (36 ppb). It should be noted that the highest concentrations of 1,4-dioxane (36 ppb) were found on the Grace property but that concentrations beyond the Grace property are now significantly lower than that used by EPA in this site-specific risk assessment. EPA has determined that even using the maximum detected concentration of 1,4-dioxane (36 ppb), dioxane contaminated groundwater does not pose an unacceptable cancer risk to human health that would necessitate an EPA clean up action. However, due to unacceptable risks from other contaminants, groundwater at the Grace Site is actively being treated.

**COMPARISON OF 1,4-DIOXANE CONCENTRATIONS IN GROUNDWATER AND DRINKING WATER TO LEVELS OF RISK
W.R. GRACE SUPERFUND SITE, ACTON AND CONCORD, MASS**

USEPA Excess Cancer Risk	USEPA Risk Ranges	Benchmark Concentrations (ppb)	Ranges of 1,4-Dioxane Concentrations in 2011					
			Drinking Water Wells		Monitoring/Remediation Wells			
			NE Area	Assabet Area	NE Area	Landfill Area	Assabet Area	
1 in 10,000	Unacceptably High Risk	67 (Highest Acceptable Risk)						
1 in 100,000								
1 in 1,000,000	Acceptable Risk	0.67 (Bottom of Risk Range)			2.1 ppb	1.5 ppb	1.8 ppb	
1 in 100,000								0.5 ppb
1 in 10,000	Little/No Risk	0.3 (MassDEP Guideline)	0.28 ppb	0.23 ppb				
1 in 1,000,000								
		0.2 (Laboratory Reporting Limit)						

WHAT IS THE POTENTIAL CANCER RISK CALCULATED BY EPA AT THE W.R. GRACE SITE?

The cancer risk estimate for the 36 ppb maximum detected 1,4-dioxane concentration is 5 in one hundred thousand (5 in 100,000). This is within EPA's acceptable risk range. It was decided to use the 36 ppb concentration because this was the highest dioxane concentration found and it represents a potential worst case scenario. It is also important to note that this risk was calculated based upon the highest concentration (36 ppb) of 1,4-dioxane on the Grace property and that because concentrations in groundwater beyond the Grace property line are significantly lower, the potential cancer risk would also be significantly lower. In addition, no one is drinking the groundwater where the highest dioxane concentrations were found on the Grace property.

HEALTH EFFECTS OTHER THAN CANCER:

The concentrations of 1,4-dioxane at the Site do not pose unacceptable non-cancer risks. At much higher

concentrations (greater than 1,000 ppb), drinking water containing 1,4-dioxane may cause damage to the liver and kidneys.

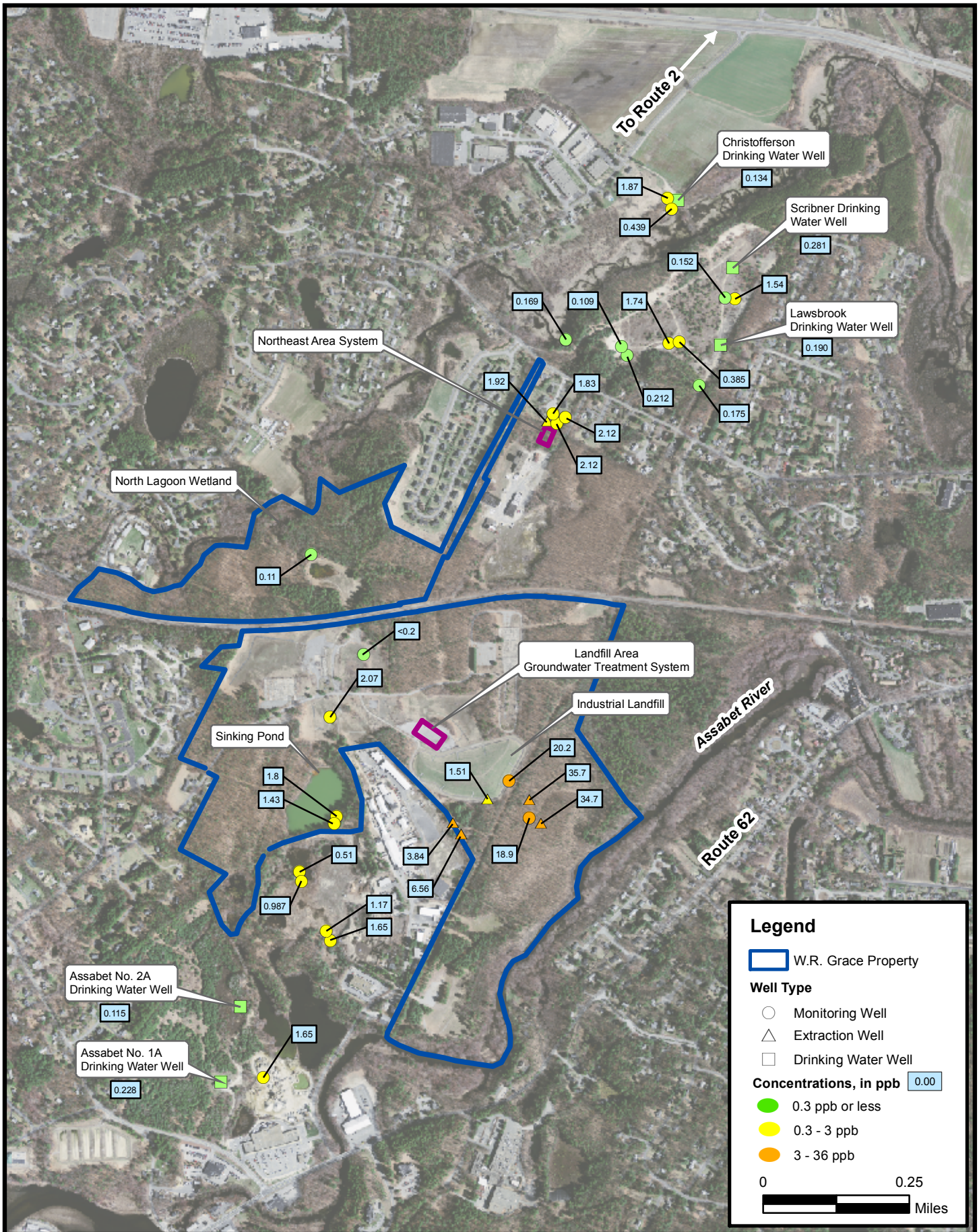
For additional information about the W.R. Grace Site go to the following website: www.epa.gov/ne/superfund/sites/graceacton

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2011 W.R. Grace Superfund Site
Sampling Locations for 1,4-Dioxane

