

July 13, 2015

Russ A Rasmussen, Administrator  
Division of Water  
Wisconsin Department of Natural Resources  
PO Box 7921  
Madison, WI 53707-7921  
[russell.rasmussen@wisconsin.gov](mailto:russell.rasmussen@wisconsin.gov)

**SENT BY ELECTRONIC MAIL**

RE: Citizens Petition for Wisconsin Health Advisory Levels or Interim Groundwater Standards for Certain Degradation Products of Dinitrotoluene (DNT)

Dear Administrator Rasmussen,

Lifetime Health Advisory Levels (HALs) are established by the Wisconsin Department of Health Services (WI DHS) for contaminants in groundwater and drinking water. HALs serve as technical guidance to assist regulators with water consumption advisories and groundwater remediation decisions.<sup>1</sup> They also provide the public with essential information about the potential health risks associated with exposure to contaminants in drinking water and well water.

The following 17 parameters have been identified by the Wisconsin Department of Natural Resources (WDNR)<sup>2</sup> or the U.S. Department of Health and Human Services<sup>3</sup> as degradation products of Dinitrotoluene (DNT) but do not have a published Wisconsin HAL or Groundwater Enforcement Standard.<sup>4</sup>

- 2-Nitroaniline
- 3-Nitroaniline
- 4-Nitroaniline
- 2-Methyl-3-Nitroaniline
- 2-Methyl-5-Nitroaniline

---

<sup>1</sup> Table: WI DNR - Drinking Water and Groundwater Quality Standards/Advisory Levels. Accessed June 11, 2015 online at <http://dnr.wi.gov/topic/drinkingwater/documents/haltable.pdf>

<sup>2</sup> Wisconsin DNR, Response to Public Comments on the Army's Alternative Feasibility Study for Groundwater, 2012, pages 39-40.

<sup>3</sup> U.S. Department of Health and Human Services, Health Consultation, Dinitrotoluene in Private Wells, Badger Army Ammunition Plant, September 30, 2006, Table 2.

<sup>4</sup> Table: WI DNR - Drinking Water and Groundwater Quality Standards/Advisory Levels. Accessed June 11, 2015 online at <http://dnr.wi.gov/topic/drinkingwater/documents/haltable.pdf>

- 2-Methyl-6-Nitroaniline
- 4-Methyl-2-Nitroaniline
- 4-Methyl-3-Nitroaniline
- 5-Methyl-2-Nitroaniline
- 2,4-Diaminotoluene
- 2,6-Diaminotoluene
- Benzofuran
- 3-Methylbenzofuran
- 5-Methylbenzofuran
- 3-Methyl-2-Nitroaniline
- 3-Methyl-4-Nitroaniline
- 3-Methyl-5-Nitroaniline

Of these, the following ten (10) identified degradation products of DNT have been detected in groundwater in **Sauk County** between January 1, 2005 and January 1, 2010 according to the WDNR's online Groundwater Retrieval Network (GRN). These search dates were selected as monitoring for these contaminants has been reduced in recent years, limiting the availability of data. Maximum reported concentrations in groundwater ranged from 16.7 to 11,000  $\mu\text{g/l}$ .<sup>5</sup> Summary tables for each of these parameters are provided as an attachment to this letter.

#### Detected in Groundwater in Sauk County

- 2-Nitroaniline
- 3-Nitroaniline
- 4-Nitroaniline
- 2-Methyl-3-Nitroaniline
- 2-Methyl-5-Nitroaniline (Synonym: 5-Nitro-o-Toluidine)
- 2-Methyl-6-Nitroaniline
- 4-Methyl-2-Nitroaniline
- 4-Methyl-3-Nitroaniline
- 5-Methyl-2-Nitroaniline
- 2,4-Diaminotoluene

Although no data was found for the remaining seven (7) identified DNT degradation products – 2,6-Diaminotoluene, Benzofuran, 3-Methylbenzofuran, 5-Methylbenzofuran, 3-Methyl-2-Nitroaniline, 3-Methyl-4-Nitroaniline, and 3-Methyl-5-Nitroaniline – **all six isomers of DNT** (the parent product) were detected in groundwater in **Sauk County**.

From January 1, 2010 to January 1, 2015, DNT was detected in 462 groundwater samples in **Sauk County**, according to the Wisconsin Groundwater Retrieval Network. Maximum reported concentrations ranged from 2.2  $\mu\text{g/l}$  to 14,000  $\mu\text{g/l}$ . By comparison, the Wisconsin Groundwater Enforcement Standard for the summed total concentration of all 6 DNT isomers (total DNT) is only 0.05  $\mu\text{g/l}$ . Summary tables for all six DNT isomers are provided as an attachment to this letter.



Groundwater monitoring wells near the Village of Prairie du Sac are tested for contamination originating from the Badger Army Ammunition Plant. The Army regularly tests residential wells and one of the Prairie du Sac's municipal wells for the explosive DNT. Irrigations wells are not tested by the Army.

<sup>5</sup>  $\mu\text{g/l}$  is micrograms per liter, the equivalent of parts per billion.

The U.S. Environmental Protection Agency has classified the mixture of 2,4- and 2,6-DNT as a Class B2 (probable human) carcinogen based on multiple benign and malignant tumor types at multiple sites in rats and malignant renal tumors in male mice. Toxicity to humans has been evaluated in DNT factory workers, munitions handlers and mining workers. Adverse health effects posed by chronic DNT exposure have been identified in the central nervous system, heart and circulatory system of humans.<sup>6</sup>

Studies indicate that 2,4- and 2,6-DNT are readily adsorbed via oral or inhalation exposure. In addition, studies have found that 2,4- and 2,6-DNT can be adsorbed through skin in toxic amounts.<sup>7</sup>

The widespread use of DNT in manufacturing munitions, polyurethane foams, and other chemical products has contributed to extensive soil and groundwater contamination.<sup>8</sup> DNT can be transported in surface water or **groundwater** because of its moderate solubility and relatively low volatility, unless degraded by light, oxygen or biota. As a result, releases to water are important sources of human exposure and remain a significant environmental concern.<sup>9</sup>

DNT is commonly found in surface water, groundwater and soil at hazardous waste sites that contain buried ammunitions waste or waste from facilities that manufacture or process DNT.<sup>10</sup> In water and soil, **DNT degrades** into a variety of degradation products through several mechanisms in the environment, including oxidation, photolysis, ozonation and chlorination and biodegradation.<sup>11</sup>

The WDNR currently requires the Army to test numerous groundwater and drinking water wells in and near the former Badger Army Ammunition Plant in Sauk County for DNT. Although certain groundwater monitoring wells have been tested for these degradation products, the Army has **not** been required to test private wells or a nearby municipal well for these parameters.

At Badger, DNT is a principal pollutant in at least three separate groundwater contaminants plumes that have migrated beyond the plant boundary. It is important to note that the selected remedy for all three plumes is natural attenuation, and **degradation** has been identified as a primary mechanism for achieving remediation of DNT at and near Badger.

In northern Wisconsin, the E.I. DuPont de Nemours & Co. ran the DuPont Barksdale Explosives Plant from 1905 to 1971. The company produced TNT, dynamite and other explosives for the military during World Wars I and II, and for the mining industry. Starting in 1997, tests found residues of explosive chemicals including DNT in 17 drinking water wells located between the site and Lake Superior. Two forms of DNT found in private well water were above the State of Wisconsin groundwater standard.

According to the Wisconsin Division of Public Health, DNT has been detected in soils and groundwater at Fort McCoy, an active military installation near Sparta, Wisconsin.

DNT is an environmental contaminant at dozens of military bases nationwide including Fort Wingate Army Depot in New Mexico, the Joliet Arsenal and Savanna Army Ammunition Plant in Illinois, Camp

---

<sup>6</sup> U.S. Environmental Protection Agency. 2008. "Drinking Water Health Advisory for 2,4-Dinitrotoluene and 2,6-Dinitrotoluene." EPA 822-R-08-010.

<sup>7</sup> U.S. Environmental Protection Agency, Integrated Risk Information System (IRIS). 1990. "2,4-/2,6-Dinitrotoluene mixture." [www.epa.gov/iris/subst/0397.htm](http://www.epa.gov/iris/subst/0397.htm)

<sup>8</sup> U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, January 2014. *Technical Fact Sheet – Dinitrotoluene*. EPA 505-F-14-010.

<sup>9</sup> U.S. Environmental Protection Agency. 2008. "Drinking Water Health Advisory for 2,4-Dinitrotoluene and 2,6-Dinitrotoluene." EPA 822-R-08-010.

<sup>10</sup> U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, January 2014. *Technical Fact Sheet – Dinitrotoluene*. EPA 505-F-14-010.

<sup>11</sup> ATSDR. 2013. "Toxicological Profile for Dinitrotoluenes." [www.atsdr.cdc.gov/toxprofiles/tp109.pdf](http://www.atsdr.cdc.gov/toxprofiles/tp109.pdf)

Edwards in Massachusetts, Weldon Springs Ordnance Works in Missouri, Umatilla Army Depot in Utah, the Hawthorne Army Depot in Nevada, and Radford Army Ammunition Plant in Virginia.

## CITIZENS PETITION

By this letter, we petition the Wisconsin Department of Natural Resources to add the following groundwater contaminants to its list of substances that have been detected and/or have a reasonable probability of entering the groundwater resources of the state, and that the WDNR request that the Wisconsin Department of Health Services review the health effects and consider establishing health advisory levels or interim groundwater standards for the following:

- 2-Nitroaniline
- 3-Nitroaniline
- 4-Nitroaniline
- 2-Methyl-3-Nitroaniline
- 2-Methyl-5-Nitroaniline
- 2-Methyl-6-Nitroaniline
- 4-Methyl-2-Nitroaniline
- 4-Methyl-3-Nitroaniline
- 5-Methyl-2-Nitroaniline
- 2,4-Diaminotoluene
- 2,6-Diaminotoluene
- Benzofuran
- 3-Methylbenzofuran
- 5-Methylbenzofuran
- 3-Methyl-2-Nitroaniline
- 3-Methyl-4-Nitroaniline
- 3-Methyl-5-Nitroaniline

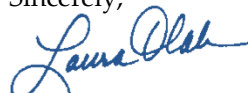
The requested values may be used by the Department in making recommendations to well owners and/or water users on continued use of their water supply and as remediation goals for the protection of groundwater resources of the state. They also provide the public with essential information about the potential health risks associated with exposure to contaminants in drinking water and well water.

We also ask that the WDNR provide a summary of any groundwater and/or drinking water data in the State of **Wisconsin** for the following identified degradation products of DNT as a statewide analysis is not possible through public access to the Groundwater Retrieval Network.

- 2,6-Diaminotoluene (CAS 823-40-5)
- Benzofuran (CAS 271-89-6)
- 3-Methylbenzofuran (CAS 21535-97-7)
- 5-Methylbenzofuran (CAS 18441-43-5)
- 3-Methyl-2-Nitroaniline (CAS 601-87-6)
- 3-Methyl-4-Nitroaniline (CAS 611-05-2)
- 3-Methyl-5-Nitroaniline (CAS 618-61-1)

Thank you in advance for your consideration and attention to our request.

Sincerely,



Laura Olah, Executive Director

Attached below:

Groundwater Sample Analytical Data Summary, Certain Degradation Products of DNT, Sauk County, January 1, 2005 to January 1, 2010, compiled by Citizens for Safe Water Around Badger,

Groundwater Sample Analytical Data Summary, Dinitrotoluene Isomers, Sauk County, January 1, 2005 to January 1, 2010, compiled by Citizens for Safe Water Around Badger.

CC by electronic mail:

U.S. Senator Tammy Baldwin

U.S. Congressman Mark Pocan

State Senator Jon Erpenbach

State Representative Dave Considine

Supervisor Bill Wenzel, Sauk County

Supervisor William Hambrecht, Sauk County

**Groundwater Sample Analytical Data Summary  
Certain Degradation Products of DNT**

**Sauk County**

January 1, 2005 to January 1, 2010<sup>12</sup>

Wisconsin Groundwater Retrieval Network

Groundwater and Environmental Monitoring System (GEMS)

Retrieved: June 11, 2015

Citizens for Safe Water Around Badger (CSWAB)

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
78142	<b>2-NITROANILINE</b>	234	22	N/A	N/A	UG/L	N/A	N/A	<b>2840</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
78300	<b>3-NITROANILINE</b>	234	3	N/A	N/A		N/A	N/A	<b>906</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
73605	<b>4-NITROANILINE</b>	234	12	N/A	N/A	UG/L	N/A	N/A	<b>640</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
49143	<b>2-METHYL-3-NITROANILINE</b>	20	13	N/A	N/A	UG/L	N/A	N/A	<b>11000</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
73622	<b>5-NITRO-O-TOLUIDINE</b> <b>(2-METHYL-5-NITROANILINE)</b>	22	1	N/A	N/A	UG/L	N/A	N/A	<b>1350</b>

<sup>12</sup> These search dates were selected as monitoring for these contaminants has been reduced in recent years, limiting the availability of data.

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
99544	<b>2-METHYL-6-NITROANILINE</b>	22	1	N/A	N/A	UG/L	N/A	N/A	<b>16.7</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
99545	<b>4-METHYL-2-NITROANILINE</b>	22	1	N/A	N/A	UG/L	N/A	N/A	<b>54.5</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
78898	<b>4-METHYL-3-NITROANILINE</b>	22	1	N/A	N/A	UG/L	N/A	N/A	<b>165</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
99546	<b>5-METHYL-2-NITROANILINE</b>	19	4	N/A	N/A	UG/L	N/A	N/A	<b>25.6</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
78888	<b>2,4-DIAMINOTOLUENE</b>	9	8	N/A	N/A	UG/L	N/A	N/A	<b>260</b>

**Groundwater Sample Analytical Data Summary  
Dinitrotoluene Isomers**

**Sauk County**

January 1, 2005 to January 1, 2010<sup>13</sup>

Wisconsin Groundwater Retrieval Network

Groundwater and Environmental Monitoring System (GEMS)

Retrieved: June 14, 2015

Citizens for Safe Water Around Badger (CSWAB)

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
34611	<b>2,4-DINITROTOLUENE</b>	424	146	.05	.005	UG/L	31	140	<b>4500</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
34626	<b>2,6-DINITROTOLUENE</b>	424	151	.05	.005	UG/L	53	149	<b>14000</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
77624	<b>2,3-DINITROTOLUENE</b>	418	96	N/A	N/A	UG/L	N/A	N/A	<b>1000</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
77631	<b>3,4-DINITROTOLUENE</b>	417	67	N/A	N/A	UG/L	N/A	N/A	<b>419</b>

Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
77632	<b>3,5-DINITROTOLUENE</b>	416	49	N/A	N/A	UG/L	N/A	N/A	<b>23.9</b>

<sup>13</sup> These search dates were selected as consistent with the Summary Tables for DNT degradation products.



Storet Code	Storet Description	# Wells With Samples	# Wells With Analytically Detectable Substance Levels	Enforcement Standard (ES)	Preventive Action Limit (PAL)	Units	# Wells Exceeding ES	# Wells Exceeding PAL	Max Detection Level
77637	<b>2,5-DINITROTOLUENE</b>	416	49	N/A	N/A	UG/L	N/A	N/A	<b>2.2</b>