**Environment Health & Safety**
**INTERNATIONAL PLACE**
**6400 Poplar Avenue**
**Memphis, TN 38197**
**(901) 419-3845**

November 9, 2018

U.S. Environmental Protection Agency, Region V
Superfund Remedial Response, Section VI (SR-6J)
77 West Jackson Boulevard
Chicago, Illinois 60604
Attn.: Ms. Jenny Davison
Remedial Project Manager

Wisconsin Department of Natural Resources - RR/5
1300 W. Clairemont Avenue
Eau Claire, Wisconsin 54702
Attn.: Ms. Mae Willkom
Remedial Project Manager

RE: Request to Modify the OU2 Sampling Program
Tomah Municipal Sanitary Landfill Superfund Site
Tomah, Wisconsin

Dear Ms. Davison and Ms. Willkom:

The City of Tomah and the International Paper (IP) request to modify the current Operable Unit 2 (OU2) groundwater monitoring program at the former Tomah Municipal Sanitary Landfill (TMSL) site. This request is based on our understanding of the hydrogeologic data and groundwater quality trends that have been collected at the TMSL site since 2000. These proposed modifications will not compromise the OU2 groundwater monitoring program, will continue to monitor the TMSL plume, and will verify the continued destruction of volatile organic compounds (VOCs) via in-situ degradation.

The proposed modification includes the following:

- Abandon fourteen monitoring wells: MW1A, MW1B, MW2A, MW2B, MW3A, MW4A, MW5A, MW5C, MW6A, MW7A, MW10A, MW11A, MW11C, and MW17A;
- Adjust the sampling schedule on MW7C from annual to biennial;
- Adjust the sampling schedule on MW12C, MW24C, and MW25C from semi-annual to annual.

**Background**

The current OU2 groundwater monitoring program consists of semi-annual sampling (May and November). The OU2 program entails sampling up to 44 monitoring wells biennially (25 wells annually and 7 wells semi-annually) and collecting 4 surface water samples semi-annually. The OU2 groundwater sampling program has been ongoing, with occasional modifications, since 2005 and some sample locations dating back to 1994. Table 1 summarizes the current groundwater sampling program.

We believe the OU2 monitoring program has determined the following related to groundwater sampling:

- The Operable Unit 1 source controls (i.e., the landfill cap and active gas extraction system), implemented in 2000, are effectively removing VOCs from the TMSL and subsequently impacts to the groundwater aquifer;
- The OU2 MNA monitoring wells define the TMSL plume boundaries, both horizontally and vertically;

- The 2018 VOC plume dimensions have remained stable since the 2014 Updated Monitored Natural Attenuation (MNA) Evaluation Report (CRA, 2015). Whereas, the VOC mass has decreased within the TMSL plume by degradation.

**Rationale for Abandonment**

The rationale to abandon these fourteen wells is based on their sampling history, groundwater quality trend analysis, and the presence of downgradient monitoring wells to monitor the plume boundaries. A site plan showing the proposed well abandonment locations is presented on Figure 1. A copy of their groundwater quality trend analysis (i.e., Mann-Kendall) is presented in Attachment A. Time vs. concentration graphs of the above mentioned wells are provided in Attachment B. Table 2 presents the historical VOC detections in the monitoring wells. Each well is discussed individually below.

MW1A, MW1B, MW2A, MW2B, MW4A, MW5A, MW5C, MW6A, MW10A, and MW17A are all located either upgradient or adjacent to the landfill. All of these wells have been either been historically non-detect or have not had unqualified detections (greater than the reporting limit) for vinyl chloride since 2004. Currently MW1B, MW2B, MW4A, MW5C, MW6A, MW10A, and MW17A are not part of the sampling program and are only used for hydraulic monitoring purposes.

MW3A and MW7A are located on the downgradient edge of the landfill. Both of these wells are currently sampled biennially. Vinyl chloride has not been detected in MW3A since 2001 and in MW7A since 2004. MW3B, MW3C, MW7C, and MW7D will all continue to be monitored.

MW11A and MW11C are located northeast of the landfill and north of the existing groundwater plume. Vinyl chloride has never been detected (100% non-detect) in either of these wells since they were first sampled in 1996. Given this long history of non-detections and known groundwater flow patterns, it appears highly unlikely that vinyl chloride would appear at these locations. These wells are currently not part of the sampling program and are only used for hydraulic monitoring purposes. MW11B will be continued to be hydraulically monitored on a routine basis.

The removal of these wells will not affect our hydrogeologic understanding of the area (e.g., groundwater flow direction) because of the approximately two decades (2000-2018) of data collected at the TMSL site. All abandoned wells will be grouted and removed by a licensed Wisconsin well driller per required guidelines.

**Rationale for Sampling Reduction**

The rationale to adjust the sampling frequency at the four wells is based on their sampling history, groundwater quality trend analysis, and the presence of downgradient monitoring wells to monitor the plume boundaries. A site plan showing the proposed well abandonment locations is presented on Figure 1. A copy of the groundwater quality trend analysis (i.e., Mann-Kendall) is presented in Attachment A. Time versus concentration graphs of the above mentioned wells are provided in Attachment B. Each well is discussed individually below.

MW7C is located on the eastern edge of the landfill and is currently sampled annually. Since 2008, the vinyl chloride concentrations have been decreasing and have been non-detect since 2017. Due to the numerous monitoring wells located downgradient, the declining vinyl chloride values, and the non-detect sampling results, GHD recommends changing the sampling frequency from annual to biennial.

MW12C is located in the center of the plume and has the highest concentration of vinyl chloride in the sampling network. MW12C is currently sampled semi-annually. Since its peak in 2011, the vinyl chloride results have steadily decreased in value the last twelve sampling events by almost 70%. Monitoring wells directly down gradient from MW12C (i.e., MW15C, MW20A, and MW20B) will continue to be sampled semi-annually. GHD recommends changing the sampling frequency of MW12C from semi-annual to annual.

MW24C was installed in 2008 downgradient of the MW19 nest as a result of the elevated vinyl chloride levels found at MW19C. Vinyl chloride has never been detected in MW24C. However, trichloroethene (TCE) was detected in MW24C above the Wisconsin Enforcement Standard (WES). Since its peak in 2012, the TCE results have steadily decreased in value the last ten sampling events and are currently below the WES. The monitoring well directly up gradient (MW19C) will continue to be sampled semi-annually. GHD recommends changing the sampling frequency of MW24C from semi-annual to annual, because TCE is below the WES.

MW25C is located east of the plume and was installed in 2010 as a result of the vinyl chloride detections at MW15C. In the 16 rounds of groundwater samples collected, vinyl chloride has never been detected in MW25C. The nearest down gradient receptor is the Heffel residential well, which is approximately 1,000 feet east of MW25C, and is sampled biennially. Due to the historical non-detects of vinyl chloride, the distance to the nearest receptor, and MW15C being sampled semi-annually, GHD recommends changing the sampling frequency of MW-25C from semi-annual to annual.

The May 2019 sampling round is a biennial sampling event. None of the four recommended sampling reductions would affect the May round, but would take effect in the November 2019 semi-annual round. Water levels will still be collected from the wells on an annual basis.

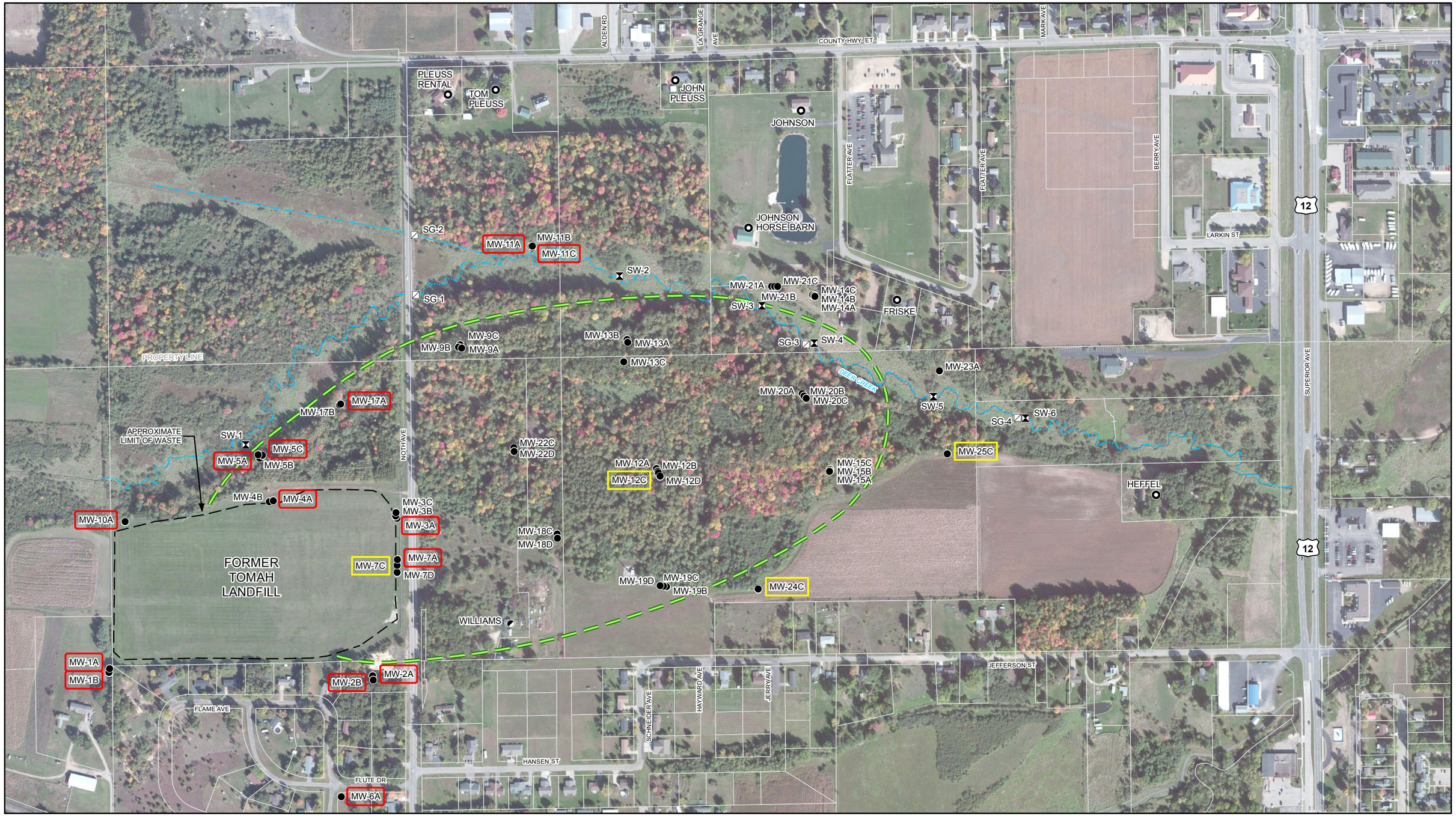
If you have any questions or comments, or require additional information, please let me know.

Very truly yours,

**INTERNATIONAL PAPER COMPANY**

Philip J. Slowiak, Sr., CSP
Senior Project Manager

c.c.: Roger Gorius; City of Tomah (w/enc.)
Penny Precour; City of Tomah (w/enc.)
Ryan Aamot; GHD (w/enc.)

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## LEGEND

- MONITORING WELL LOCATION
- STAFF GAUGE LOCATION
- SURFACE WATER SAMPLING LOCATION
- RESIDENTIAL WELL LOCATION
- CONVERTED FORMER RESIDENTIAL WELL
- ESTIMATED EXTENT OF VINYL CHLORIDE (>0.2 µG/L)
- MW-7A — WELL PROPOSED FOR ABANDONMENT
- MW-7C — WELL PROPOSED FOR REDUCED SAMPLING

GHD

TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN
OU1 AND OU2 MONITORING REPORT

012865-80
Nov 9, 2018

SITE PLAN

FIGURE 1

GIS File: I:\GIS\Projects\6-chars\01----\0128--\012865\012865-CORR\012865-80(DAVI016)\012865-80(DAVI016)GIS-SP001.mxd

**Table 1**

**Summary of Operable Unit 2 (OU2) Monitoring Locations**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**

**Monitoring Well Network (54 Locations)**

Semi-Annual Locations (7)

| | |
|---|---|
| MW-12C | MW-20B |
| MW-15C | MW-24C |
| MW-19C | MW-25C |
| MW-20A | |

Annual Locations (26)

| | |
|---|---|
| MW-1B * | MW-13C |
| MW-2B * | MW-15A |
| MW-4A * | MW-15B |
| MW-5C * | MW-17A * |
| MW-6A * | MW-17B |
| MW-7C | MW-18C |
| MW-9A * | MW-18D |
| MW-10A * | MW-19B |
| MW-12A | MW-19D |
| MW-12B | MW-20C |
| MW-12D | MW-22C |
| MW-13A | MW-22D |
| MW-13B | MW-23A |

Biennial Locations (21)

| | |
|---|---|
| MW-1A | MW-9C |
| MW-2A | MW-11A * |
| MW-3A | MW-11B |
| MW-3B | MW-11C * |
| MW-3C | MW-14A |
| MW-4B | MW-14B |
| MW-5A | MW-14C |
| MW-5B | MW-21A |
| MW-7A | MW-21B |
| MW-7D | MW-21C |
| MW-9B | |

**Residential Well Network (3 Locations)**

Annual Locations (1)

Larry Friske

Biennial Locations (1)

David Heffel

Locations Sampled Every 5 Years (1)

Ruth Williams (Hanson)

**Surface Water Network (8 Locations)**

Semi-Annual Locations (4)

SW-3
SW-4
SW-5
SW-6

Annual Locations (4)

SG-1*
SG-2*
SG-3*
SG-4*

Note:

* - Groundwater/Surface Water Elevation Reading ONLY
1 - John Pluess's private well was sampled as apart of gaining access to the monitoring wells (MW13A and MW13B)
2 - Tom Pluess's private and rental property wells were sampled as apart of gaining access to the monitoring wells (MW9A, B, C and MW11A, B, C)

# Attachment A
# Mann-Kendall Analysis

**Attachment A**

**Mann-Kendall Trend Tests Results for Vinyl Chloride Concentrations in Groundwater**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**

| | | | | | Historical Data | | | | | | Recent Data [4] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Mann-Kendall Trend test | | | | | | Mann-Kendall Trend test | | |
| Well | Unit | Current Sampling Frequency | Most Recent Vinyl Chloride Concentration | Number of Sampling Rounds | Date Range | Data Set [1] | Percent non-detects | Statistic [2] | Probability [3] | Conclusion | Date Range | Data Set [5] | Percent non-detects | Statistic [2] | Probability [3] | Conclusion |
| MW-1A | µg/L | Biennial | ND (0.5) | 18 | 2000 - 2017 | 9 | 100% | -- | -- | 100% ND | 2003 - 2017 | 8 | 100% | -- | -- | 100% ND |
| MW-1B | µg/L | NLS | ND (0.5) | 11 | 2000 - 2005 | 11 | 100% | -- | -- | 100% ND | -- | -- | -- | -- | -- | -- |
| MW-2A | µg/L | Biennial | ND (0.5) | 21 | 2000 - 2017 | 9 | 78% | -- | -- | >50% ND | 2003 - 2017 | 8 | 88% | -- | -- | >50% ND |
| MW-2B | µg/L | NLS | ND (0.5) | 17 | 2000 - 2009 | 17 | 29% | -117 | 1.2E-06 | **Decreasing Trend** | -- | -- | -- | -- | -- | -- |
| MW-3A | µg/L | Biennial | ND (0.5)/ND (0.5) | 21 | 2000 - 2017 | 9 | 100% | -- | -- | 100% ND | 2003 - 2017 | 8 | 100% | -- | -- | 100% ND |
| MW-4A | µg/L | NLS | ND (0.5) | 8 | 2000 - 2005 | 8 | 63% | -- | -- | >50% ND | -- | -- | -- | -- | -- | -- |
| MW-5A | µg/L | Biennial | ND (0.5) | 18 | 2000 - 2017 | 9 | 89% | -- | -- | >50% ND | 2003 - 2017 | 8 | 100% | -- | -- | 100% ND |
| MW-5C | µg/L | NLS | ND (0.5) | 8 | 2000 - 2005 | 8 | 88% | -- | -- | >50% ND | -- | -- | -- | -- | -- | -- |
| MW-6A | µg/L | NLS | ND (0.5) | 11 | 2000 - 2005 | 11 | 100% | -- | -- | 100% ND | -- | -- | -- | -- | -- | -- |
| MW-7A | µg/L | Biennial | ND (0.5) | 25 | 2000 - 2017 | 9 | 78% | -- | -- | >50% ND | 2003 - 2017 | 8 | 88% | -- | -- | >50% ND |
| MW-7C | µg/L | Annual | ND (0.5) | 22 | 2005 - 2018 | 13 | 15% | -59 | 3.9E-04 | **Decreasing Trend** | 2011 - 2018 | 8 | 25% | -25 | 0.003 | **Decreasing Trend** |
| MW-10A | µg/L | NLS | ND (0.5) | 8 | 2000 - 2005 | 8 | 100% | -- | -- | 100% ND | -- | -- | -- | -- | -- | -- |
| MW-11A | µg/L | NLS | ND (0.5) | 13 | 2000 - 2013 | 11 | 100% | -- | -- | 100% ND | 2003 - 2013 | 8 | 100% | -- | -- | 100% ND |
| MW-11C | µg/L | NLS | ND (0.5) | 13 | 2000 - 2013 | 11 | 100% | -- | -- | 100% ND | 2003 - 2013 | 8 | 100% | -- | -- | 100% ND |
| MW-12C | µg/L | Semi-Annual | 150 | 50 | 2000 - 2018 | 35 | 0% | 223 | 0.002 | **Increasing Trend** | 2014 - 2018 | 8 | 0% | 4 | 0.708 | No trend identified |
| MW-17A | µg/L | NLS | ND (0.5) | 8 | 2000 - 2005 | 8 | 75% | -- | -- | >50% ND | -- | -- | -- | -- | -- | -- |
| MW-24C | µg/L | Semi-Annual | ND (0.5) | 23 | 2009 - 2018 | 18 | 100% | -- | -- | 100% ND | 2014 - 2018 | 8 | 100% | -- | -- | 100% ND |
| MW-25C | µg/L | Semi-Annual | ND (0.5) | 17 | 2010 - 2018 | 15 | 100% | -- | -- | 100% ND | 2014 - 2018 | 8 | 100% | -- | -- | 100% ND |

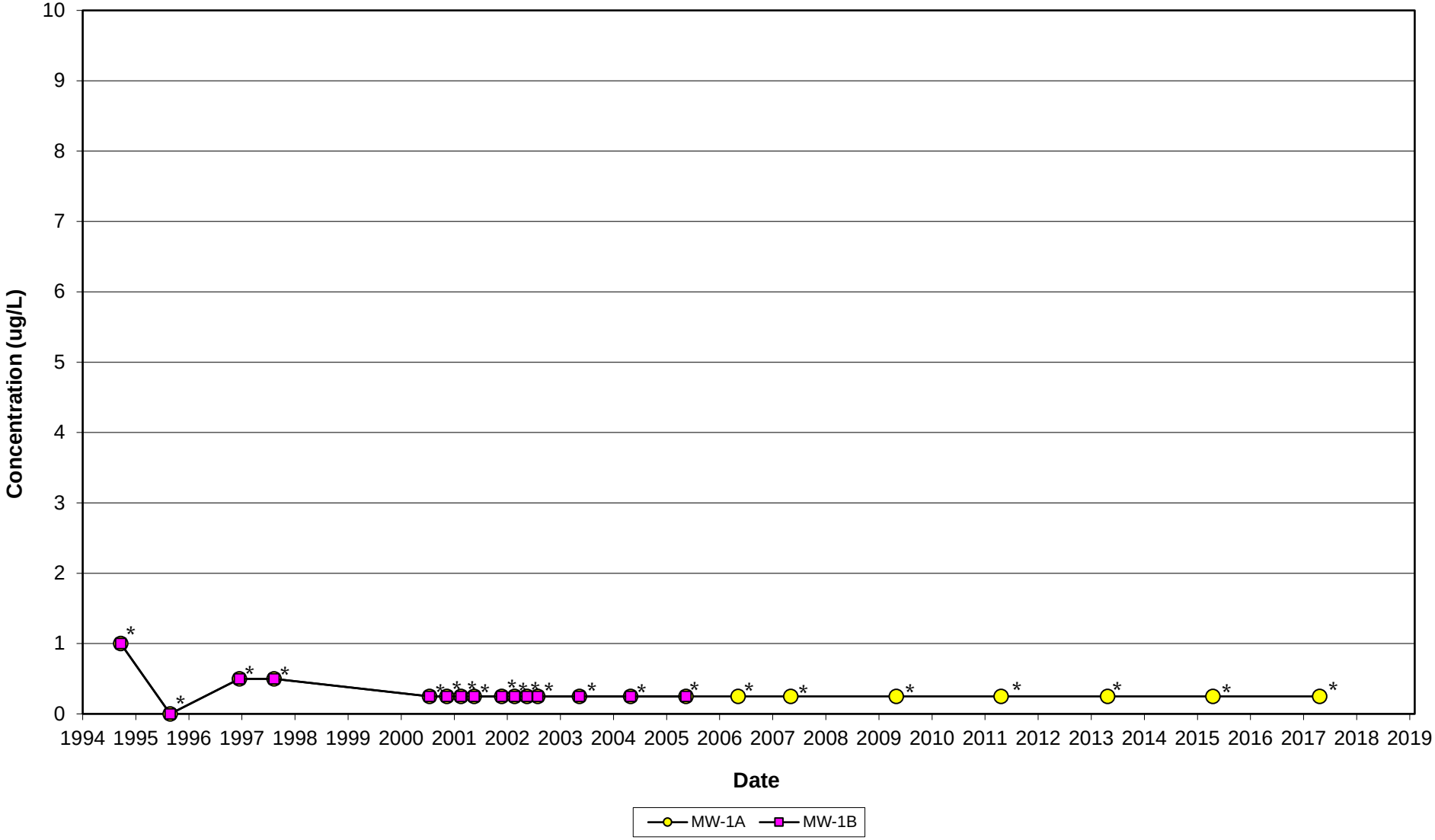
Note:

(1) - Number of observations used in the analysis are as follows:
- For Biennial data: the data frequency in the recent years was used (every other year), therefore any samples collected more than once in any alternating year were removed from the trend test.
- For Annual data: the data frequency in the recent years was used (once per year), therefore any samples collected more than once in any given year were removed from the trend test.
- For Semi-Annual data: the data frequency in the recent years was used (twice per year), therefore any samples collected more than twice in any given year were removed from the trend test.

In all cases listed above, non-detect results are treated as zero, unless all results were non-detect for the period, in which case the average reporting limit is used to represent the period observation.
(2) - Calculated as the sum of the signs of all possible pair-wise data comparisons.
(3) - Probability of significance: A 95 percent confidence was used for data sets greater than 4 observations; a 90 percent confidence was used for data sets equal to 4 observations; No analysis performed on data sets less than 4 observations.
(4) - The eight most recent observations in the data set are used.
(5) - The same rules that were used for the historical data set are applied for the recent data set, except for the biennial sampling frequency wells, where the eight most recent samples are taken, regardless of sampling frequency.
100% ND - No detected results.
>50% ND - Over 50 percent of results are non-detects.
NLS - No longer sampled
ND (0.5) - not detected (reporting limit).
Request for sampling reduction
Request for abandonment

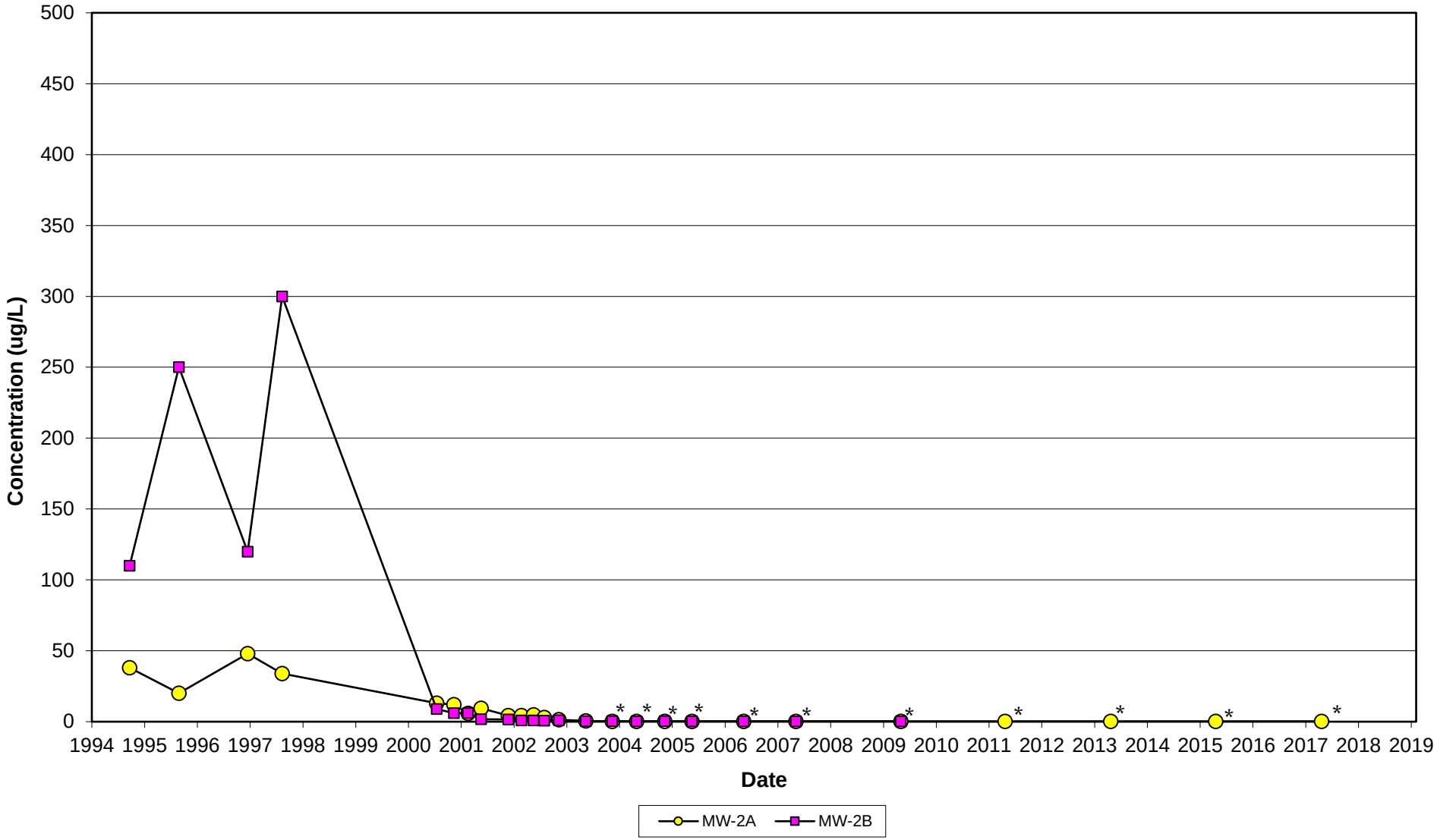
# Attachment B
# Graphs

**Attachment B2.1**
**Vinyl Chloride Concentrations Over Time**
**(MW-1 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



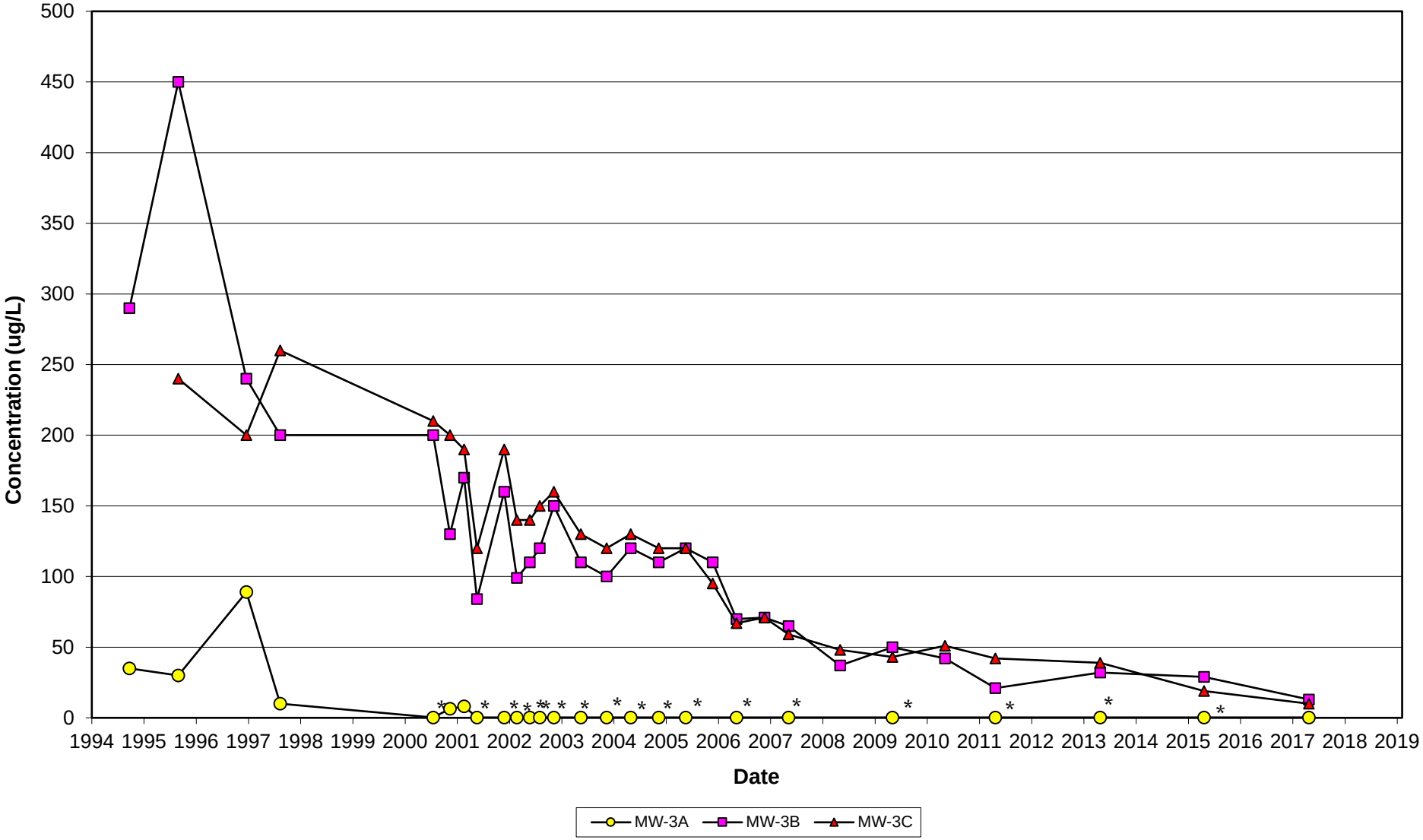

* - Vinyl chloride not-detected. Value(s) graphed are equal to one-half the laboratory detection limit.

**Attachment B2.2**
**Vinyl Chloride Concentrations Over Time**
**(MW-2 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



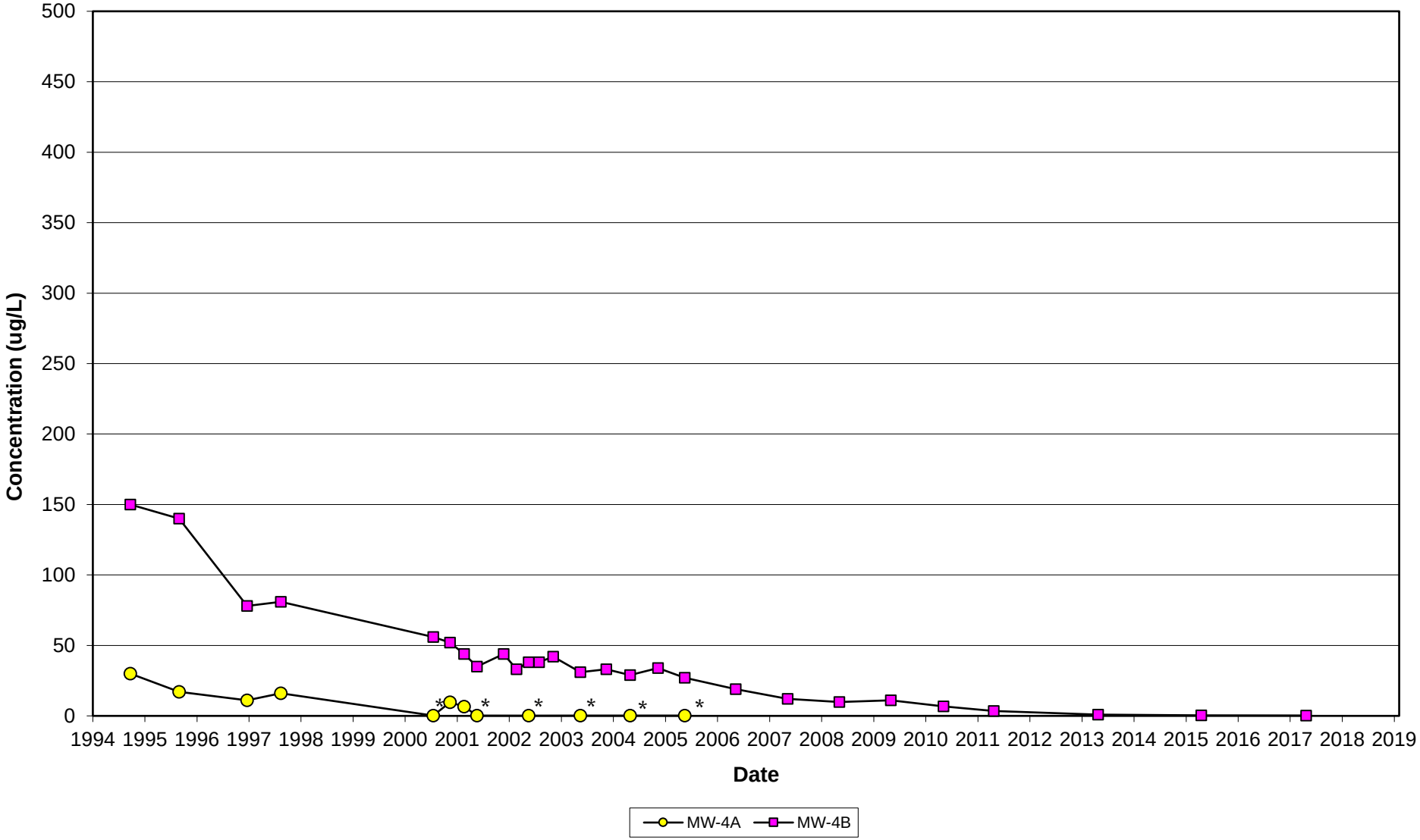

* - Vinyl chloride not-detected. Value graphed is equal to one-half the laboratory detection limit.

**Attachment B2.3**
**Vinyl Chloride Concentrations Over Time**
**(MW-3 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



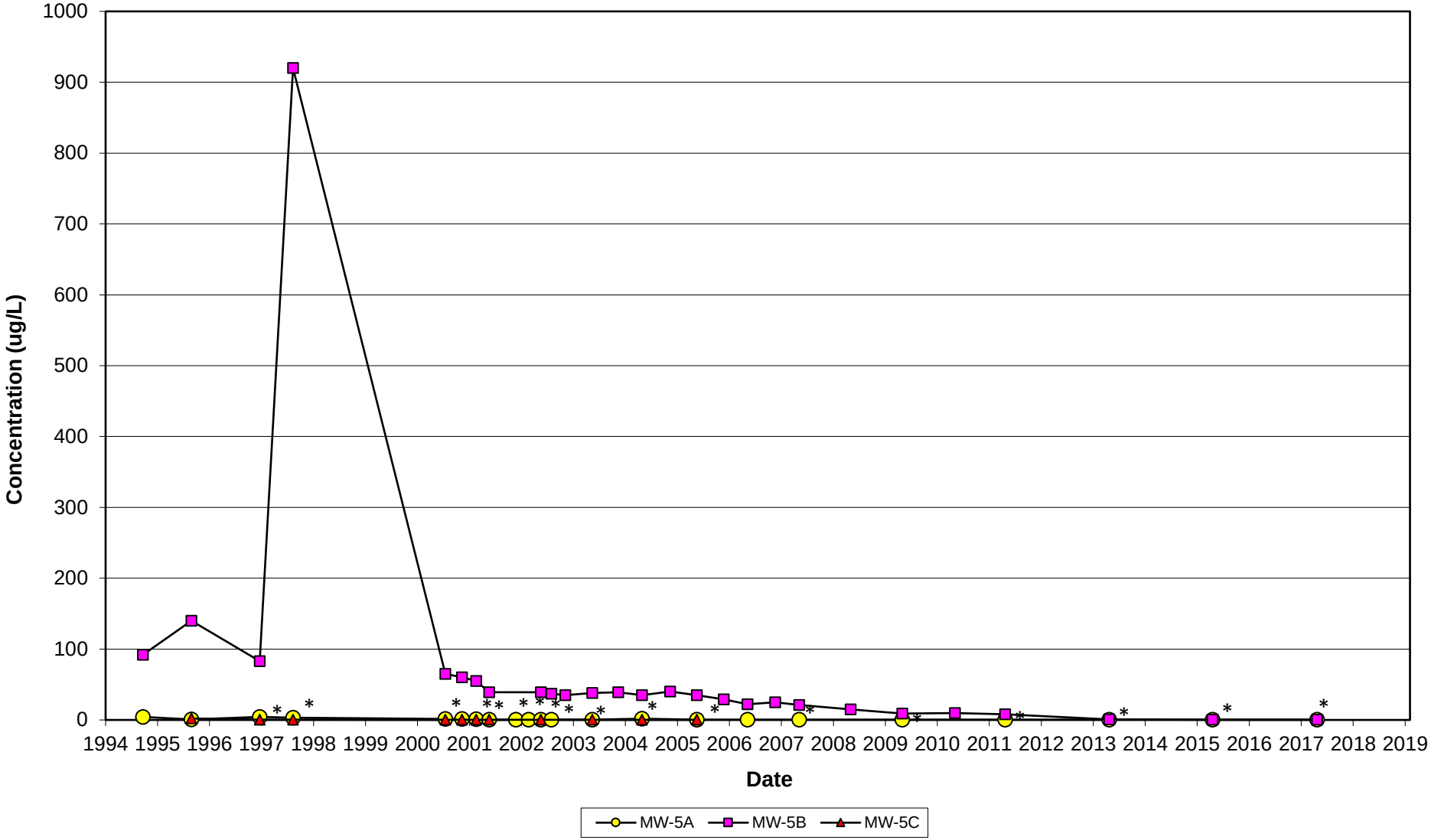

* - Vinyl chloride not-detected. Value(s) graphed are equal to one-half the laboratory detection limit.

**Attachment B2.4**
**Vinyl Chloride Concentrations Over Time**
**(MW-4 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



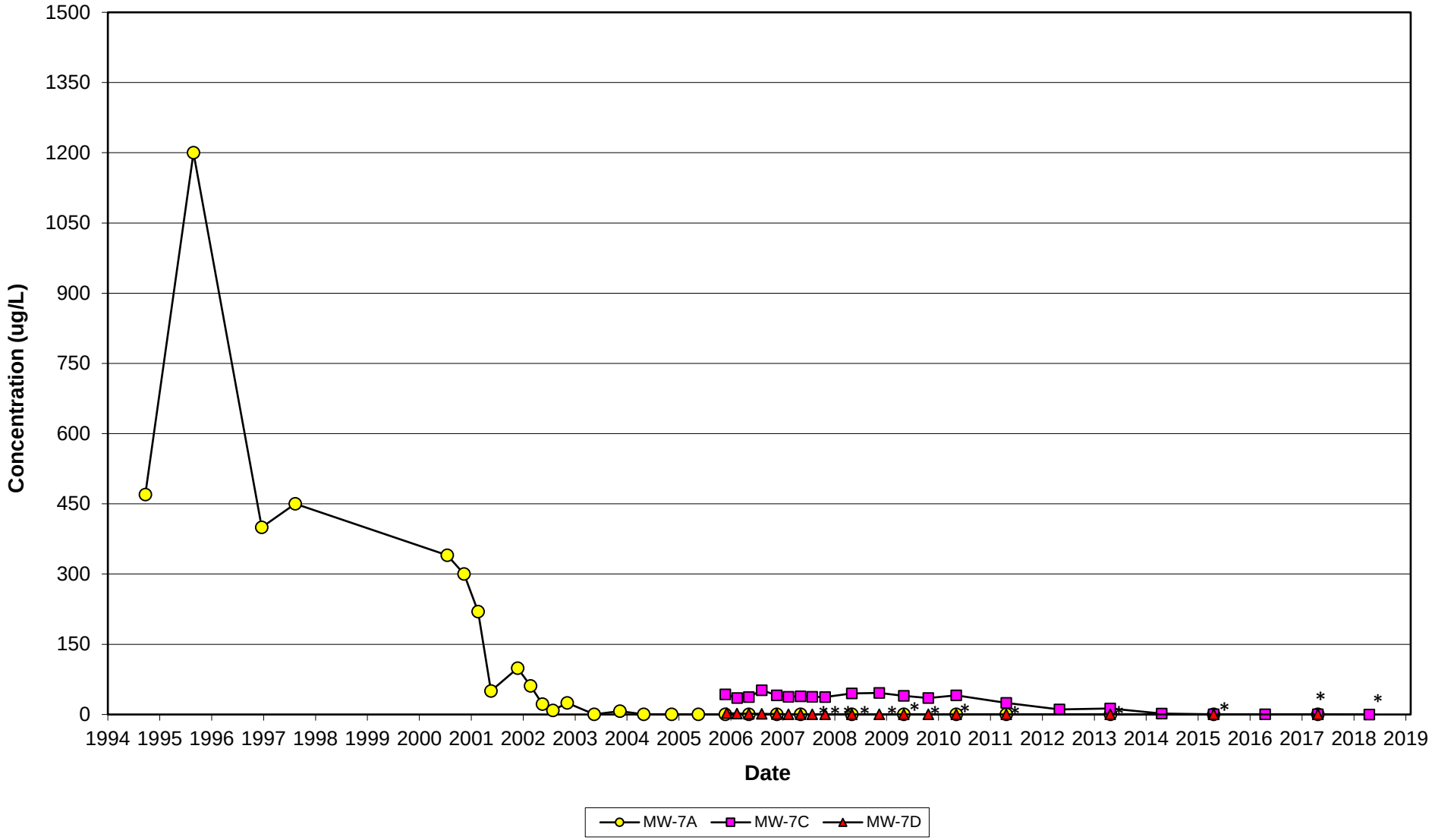

* - Vinyl chloride not-detected. Value(s) graphed are equal to one-half the laboratory detection limit.

**Attachment B2.5**
**Vinyl Chloride Concentrations Over Time**
**(MW-5 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



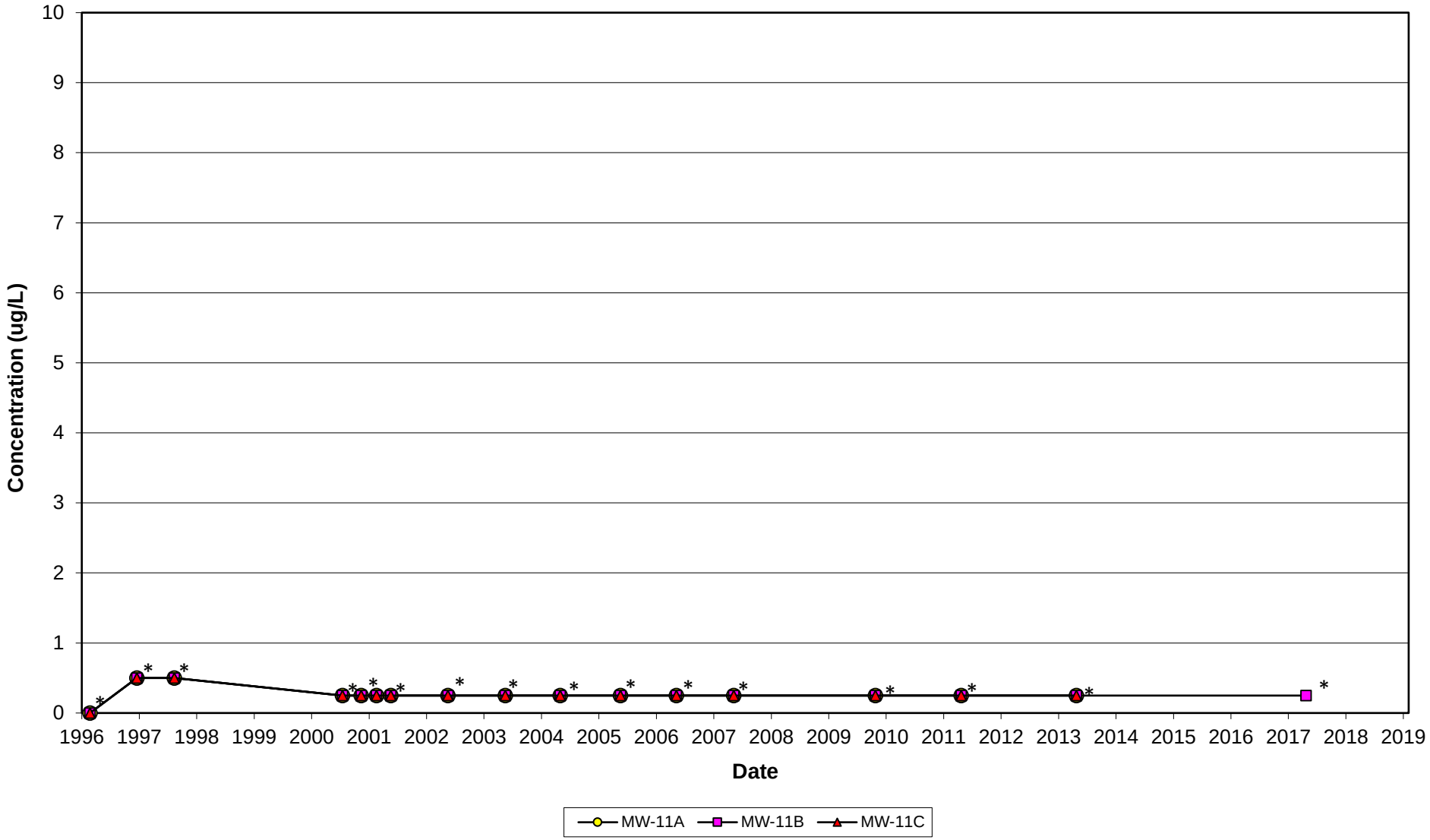

* - Vinyl chloride not-detected. Value(s) graphed are equal to one-half the laboratory detection limit.

**Attachment B2.6**
**Vinyl Chloride Concentrations Over Time**
**(MW-7 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



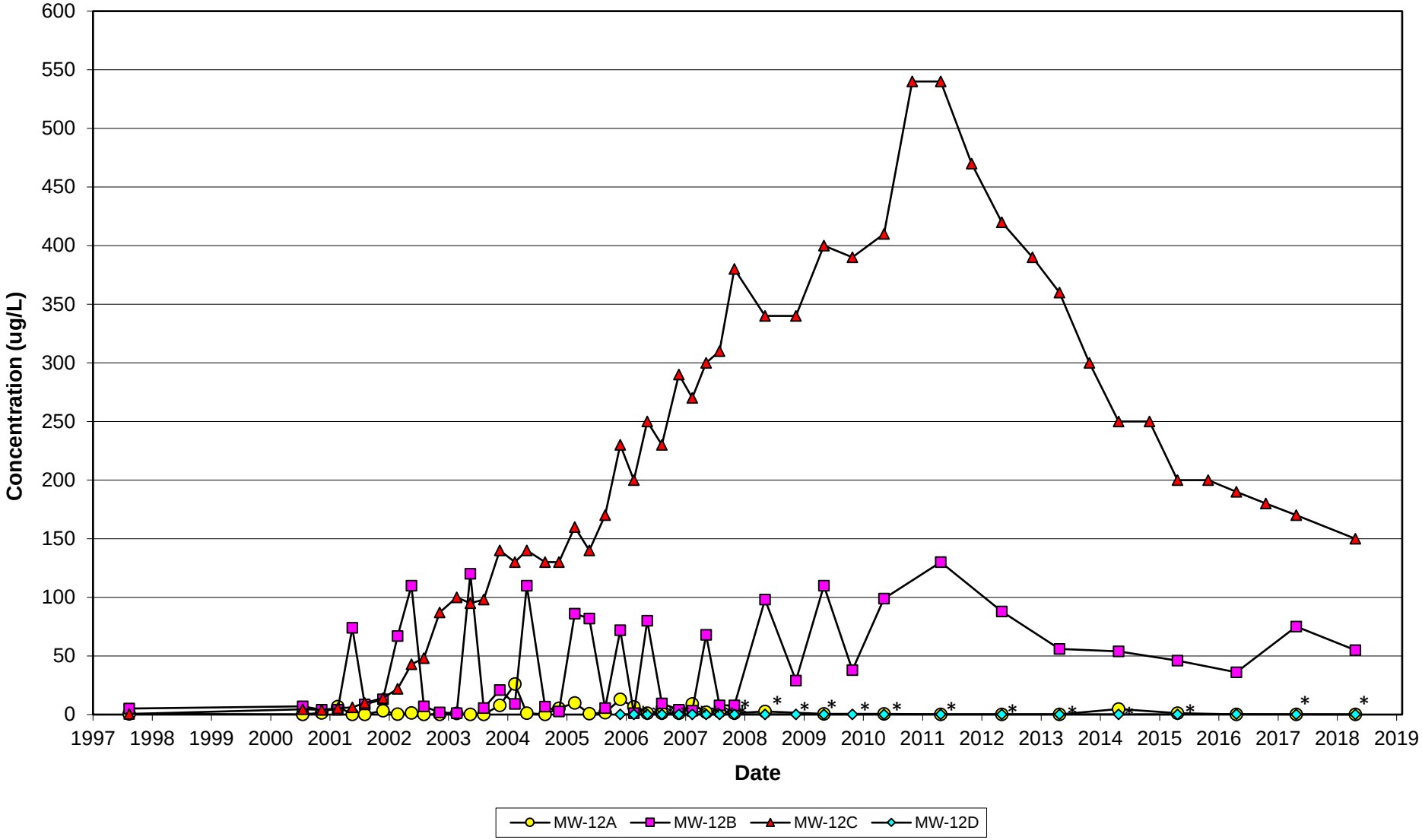

* - Vinyl chloride not-detected. Value graphed is equal to one-half the laboratory detection limit.

**Attachment B2.7**
**Vinyl Chloride Concentrations Over Time**
**(MW-11 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



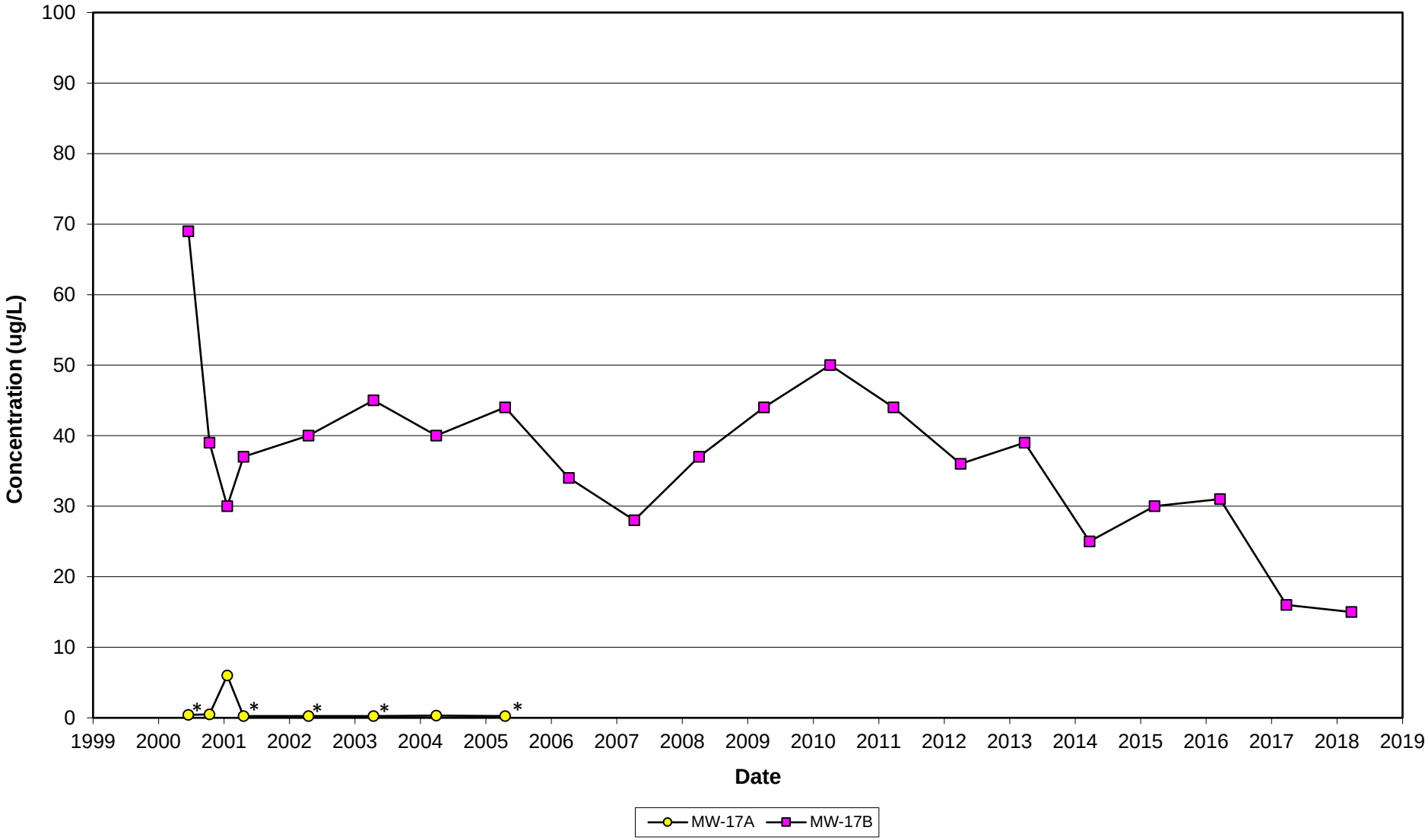

* - Vinyl chloride not-detected. Value(s) graphed are equal to one-half the laboratory detection limit.

**Attachment B2.8**
**Vinyl Chloride Concentrations Over Time**
**(MW-12 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



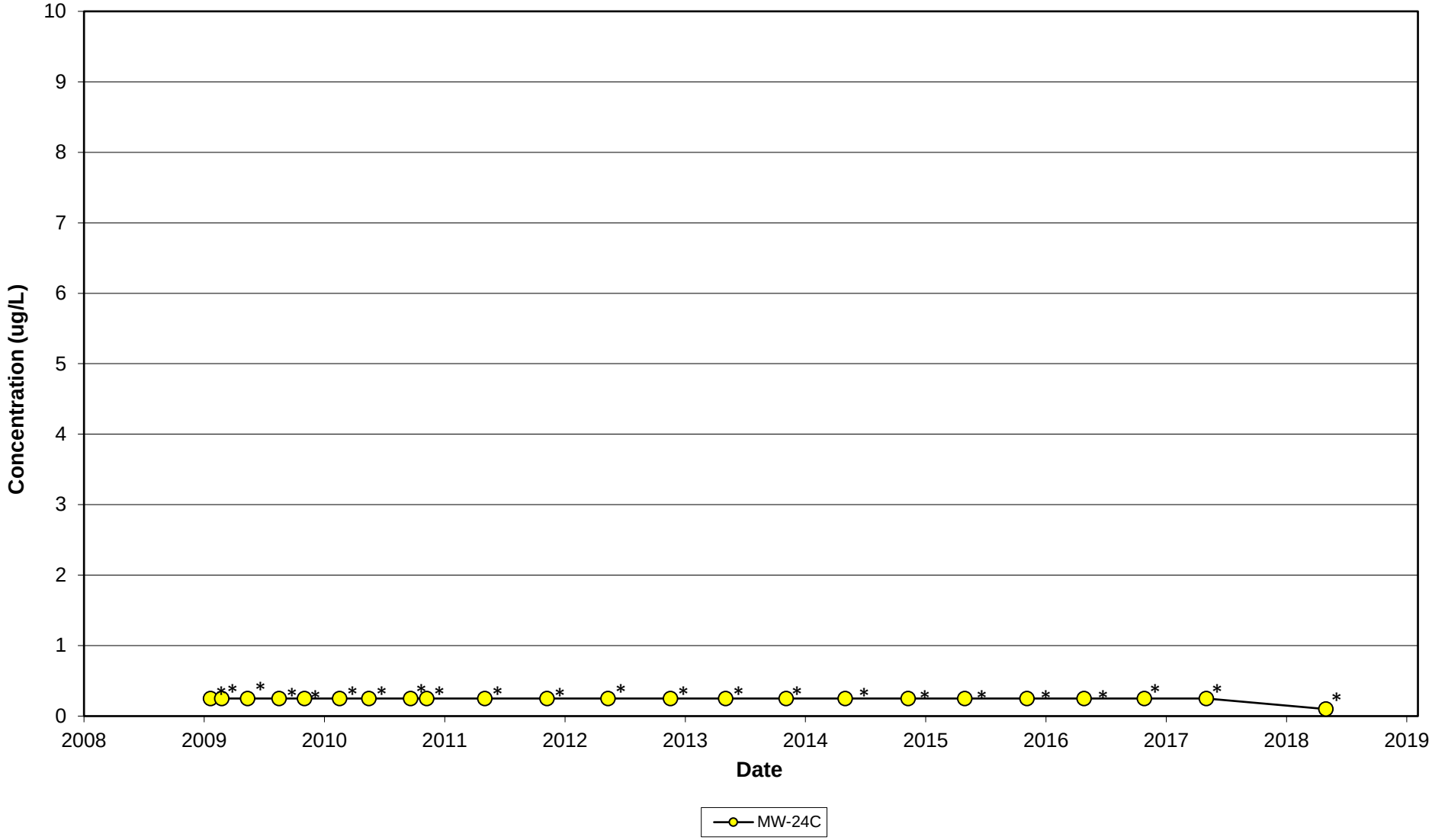

* - Vinyl chloride not-detected. Value graphed is equal to one-half the laboratory detection limit.

**Attachment B2.9**
**Vinyl Chloride Concentrations Over Time**
**(MW-17 NEST)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**



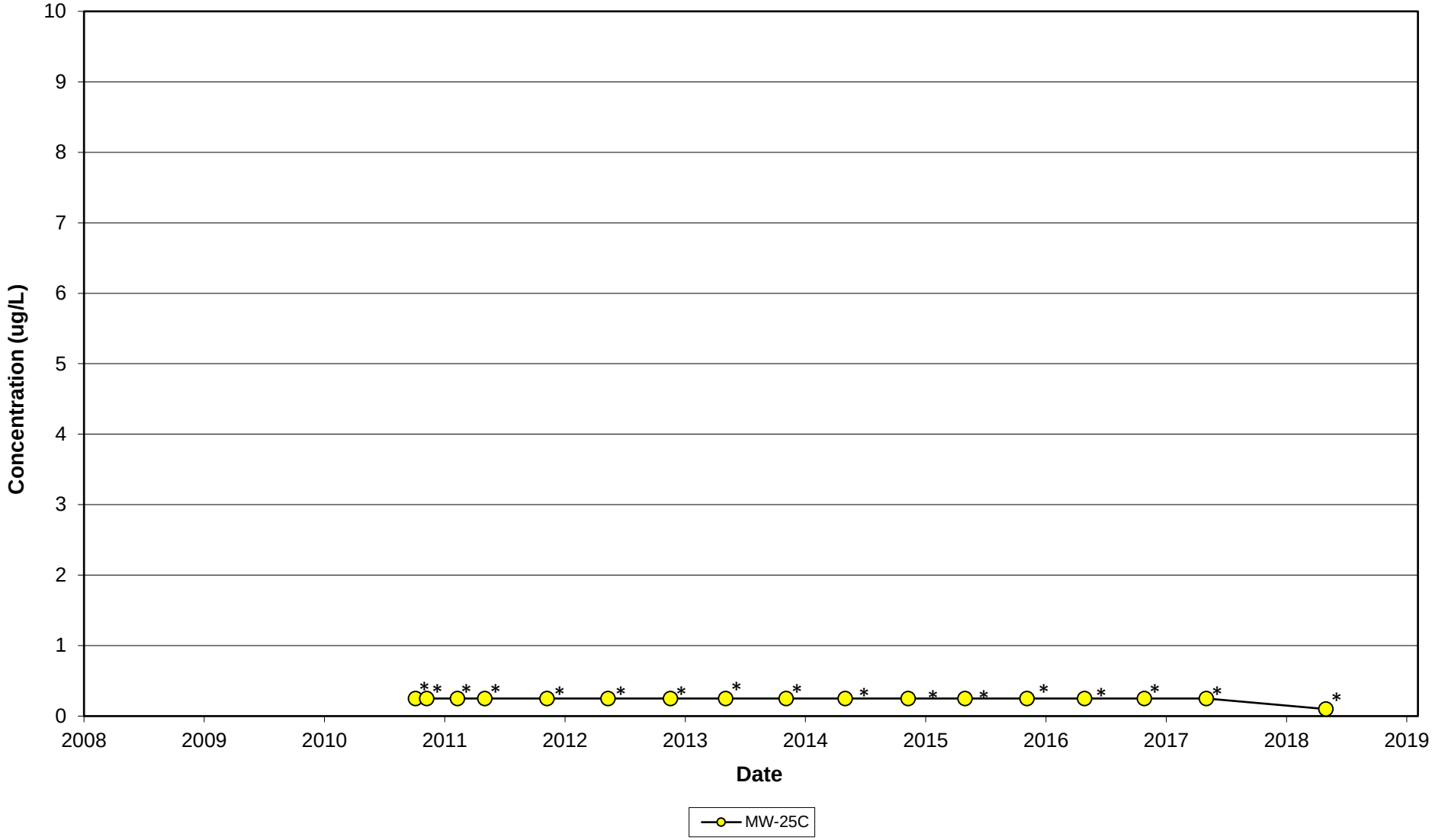

* - Vinyl chloride not-detected. Value graphed is equal to one-half the laboratory detection limit.

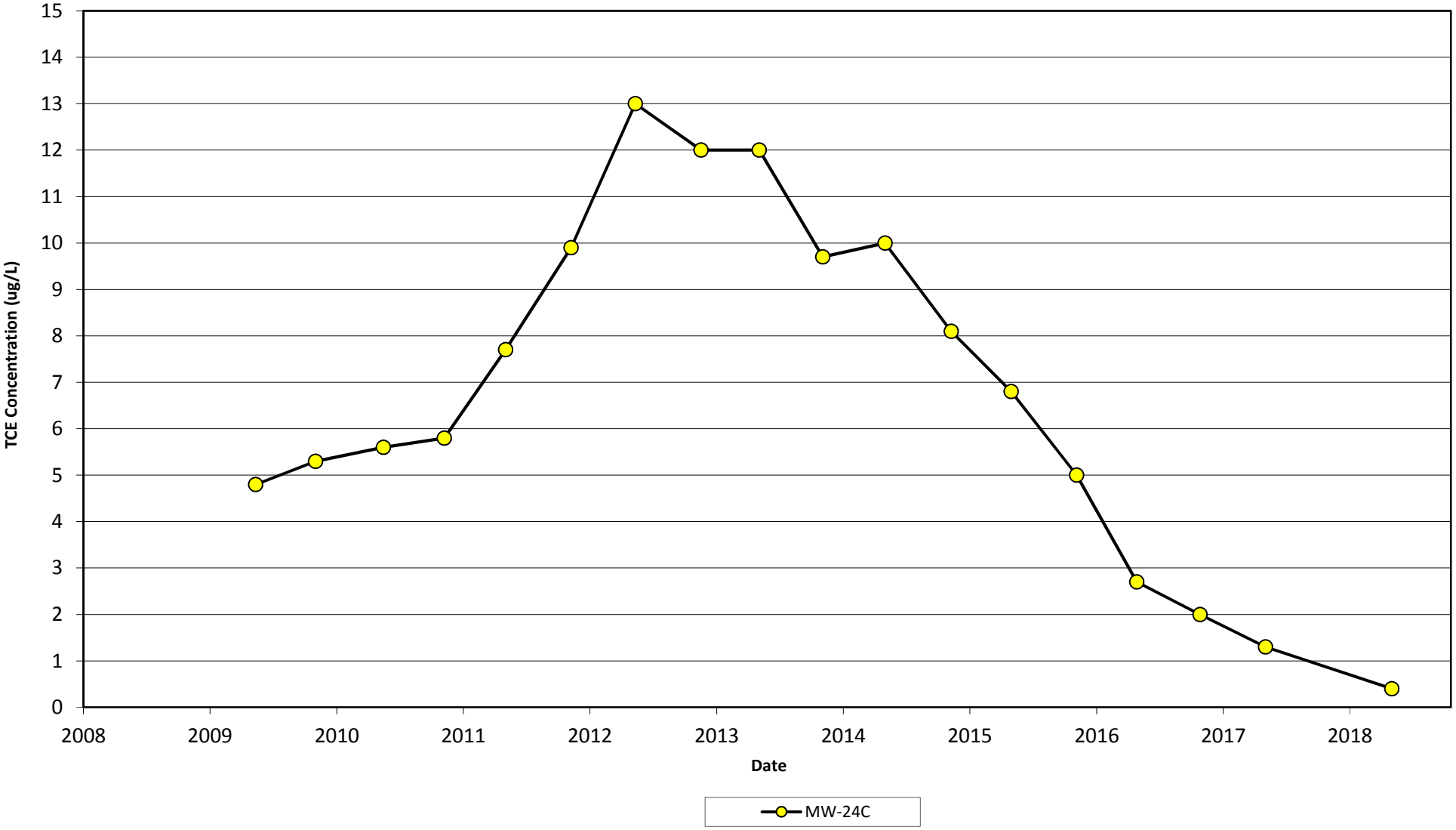
**Attachment B2.10**
**Vinyl Chloride Concentrations Over Time**
**(MW-24C)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**




* - Vinyl chloride not-detected. Value graphed is equal to one-half the laboratory detection limit.

**Attachment B2.11**
**Vinyl Chloride Concentrations Over Time**
**(MW-25C)**
**Tomah Municipal Sanitary Landfill Superfund Site**
**Tomah, Wisconsin**




* - Vinyl chloride not-detected. Value graphed is equal to one-half the laboratory detection limit.

**Attachment B.2.12**
**MW-24C**
**Trichloroethene Concentrations**
**Tomah Municipal Sanitary Landfill Superfund**
**Site Tomah, Wisconsin**