Memorandum

# Response to Comments on Vapor Intrusion Work Plan Review With Comments

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| **Date:** | September 4, 2024 |
| **Project name:** | Tyco Fire Products LP, One Stanton Street, Marinette, Wisconsin |
| **Project no:** | D3868400 |
| **Attention:** | Andrew Kleinberg |
| **Company:** | U.S. Environmental Protection Agency |
| **Prepared by:** | Jacobs |
| **Document no:** | D3838400.314 |
| **Copies to:** | Sarah Krueger, WDNR<br>Angela Carey, WDNR<br>Ryan Suennen, Tyco Fire Products<br>Denice Nelson, Johnson Controls<br>Heather Ziegelbauer, Jacobs<br>Dave Finney, Jacobs |

**Jacobs Engineering Group Inc.**
1610 N 2nd Street
Suite 201
Milwaukee, WI 53212
United States
T +1.414.272.2426
F +1.414.272.4408
www.jacobs.com

On behalf of Tyco Fire Products LP (Tyco), Jacobs Engineering Group Inc. (Jacobs) prepared this memorandum to respond to U.S. Environmental Protection Agency's (EPA's) and Wisconsin Department of Natural Resources (WDNR's) (collectively referred to as the Agencies) comments on the *Revised Vapor Intrusion Assessment and Work Plan* (2021 Work Plan) dated March 17, 2021 (Jacobs 2021). The Agencies' comments were provided in email on December 20, 2023.

The Agencies' comments on the 2021 Work Plan were discussed during an April 4, 2024 meeting between Tyco and the Agencies. Following this meeting, EPA sent an email on April 23, 2024, indicating they wanted to schedule a follow-up meeting. A meeting agenda was sent on August 1, 2024, and the follow-up meeting took place on August 8, 2024.

As discussed during the two meetings, Tyco is requesting the Agencies' review and approval of the modified VI investigation approach presented herein. Following concurrence on the general approach, Tyco will prepare and submit an updated Vapor Intrusion Assessment and Work Plan for review by the Agencies.

Each of the Agencies' comments on the 2021 Work Plan is repeated in *italic* font, followed by the Tyco responses in plain text.

1. Agencies Comment:

   *Develop a separate Conceptual Site Model (CSM) as it relates to volatile organic compounds (VOCs) and vapor intrusion (VI). The current CSM is developed for groundwater, soil, and sediment contamination that resulted from arsenic-salt waste piles and does not consider all migration pathways that are relevant to VOCs and VI. The CSM must include an assessment of preferential pathways, e.g. utilities, to meet the requirements of Wis. Admin Code NR716.11(5)(a).*

   a. *An evaluation should be performed to determine if the current and/or historic underground utilities may be acting as a preferential pathway for contaminant migration and should* *include information on how utilities were abandoned. Guidance document RR-649 provides information on investigating human-made preferential pathways.*

b. *VI must be reevaluated as site conditions change, including but not limited to utility modifications, and building construction or use. For example, building 14 has been modified (Groundwater Containment and Treatment System improvements) and must be reassessed for VI.*

**Tyco Response**.

A draft CSM specific to VI that also includes an assessment of preferential pathways is provided as Attachment 1. An updated CSM will be provided as part of the updated VI assessment and work plan. This CSM will be further updated and refined as more information becomes available, including the findings from future VI investigations.

An evaluation of preferential pathways will be performed using Wisconsin guidance RR-649 (WDNR 2021),[1] which was published after the 2021 Work Plan was submitted to EPA. Reassessment of Building 14 will also be included in the VI investigation.

As noted previously, a meeting was held on April 4, 2024, with the Agencies to discuss the Agencies' comments on the 2021 Work Plan. During the meeting, Tyco presented an updated approach for the VI investigation, which is provided herein as Attachment 2. The proposed approach includes an initial real-time assessment, which would be followed up with conventional VI sampling informed by the results of this initial assessment.

The initial real-time assessment would use a portable gas chromatography/mass spectrometry (HAPSITE GC/MS) instrument to: (1) conduct initial sampling of indoor air in buildings; and (2) assess the potential for VI through the sanitary sewers and other identified utility conduits. The HAPSITE data would not be used to make human health risk calculations or risk-management decisions. The data would be used as a line of evidence to help refine locations for conventional sampling (i.e., canister or passive sampling for laboratory analysis). Additional information is provided below.

<u>HAPSITE sampling of sanitary sewer and other identified utility conduits:</u>

HAPSITE GC/MS sampling is proposed to assess the potential for VI through the sanitary sewers and other identified utility conduits (use of a portable GC/MS is one of the assessment methods referenced in WDNR guidance [WDNR 2021, p. 13]). This will include sampling of sewer manholes, as well as potential preferential pathway VI entry points, such as plumbing and drains in buildings in and around the areas where VOC concentrations in groundwater exceed vapor risk screening levels (VRSLs).

During this initial assessment, and in instances where HAPSITE-measured concentrations in a sanitary sewer main or other identified utility conduits are less than 10 percent of the sanitary sewer gas screening levels (SSGSLs), Tyco is requesting that the HAPSITE data be considered sufficient to conclude that no further sampling in the corresponding sewer main or utility is needed consistent with the chart presented in WDNR guidance (WDNR 2021, Figure 5). In support of this request, Attachment 3 (Vapor Intrusion VOC HAPSITE Analyte List) shows the VOCs of interest along with their SSGSLs and the corresponding HAPSITE reporting limits, which are well below 10 percent of the SSGSLs. For

[1] Wisconsin Department of Natural Resources (WDNR). 2021. *Guidance for Documenting the Investigation of Human-made Preferential Pathways Including Utility Corridors.* RR-649, June. https://widnr.widen.net/s/kxtjjk5hbg.

example, the HAPSITE reporting limit for trichloroethene (TCE) is 0.27 micrograms per cubic meter (µg/m$^3$) (Attachment 3), which is comparable to that obtained for grab samples collected using canisters (WDNR's preferred method for sampling manholes; WDNR 2021, p.14). This reporting limit is also three orders of magnitude below the commercial SSGSL for TCE of 290 µg/m$^3$ and two orders of magnitude below 10 percent of that SSGSL. WDNR indicates that if the results from the initial grab samples are less than 10 percent of the SSGSL, neither continued sampling at the same manholes nor assessment of impact to adjacent structures is needed (WDNR 2021, p. 15). To further demonstrate the adequacy of the HAPSITE GC/MS, replicate grab sampling using evacuated canisters or passive samplers, will be conducted for a subset of the utility locations sampled based on HAPSITE results.

<u>HAPSITE sampling of building indoor air:</u>

In addition to supporting the assessment of preferential pathways, the HAPSITE GC/MS will be used to sample indoor air in the buildings. This sampling will be conducted to better understand the distribution of VOC concentrations in indoor air and to evaluate the presence of potential VOC contributions from background sources (e.g., VOC storage or usage for manufacturing).

The HAPSITE sampling information will be used to inform follow-up indoor air sampling using conventional sampling techniques, including canister or passive sampling, but will not be used to screen out buildings or supporting human health risk calculations.

2. Agencies Comment:

*Tyco has proposed a screening process to determine which buildings should be assessed for VI. The screening process does not meet requirements outlined in RR-800. Buildings are considered occupied even when used infrequently. When VOCs are used or stored inside a building, the potential for VI of all contaminants of concern must still be evaluated, including those not currently in use (e.g. TCE).*

   a. *The screening process did not include preferential pathways. An evaluation of preferential pathways must be included in the VI assessment; indoor air sampling may not be used as screening criteria in lieu of this assessment as indicated on page 4. The potential for in-pipe vapor migration should be assessed and include an evaluation of sanitary sewer(s) connected to buildings that utilized VOCs. Guidance document RR-649 provides information on performing an in-pipe sanitary investigation.*

   b. *The use of VOCs in a building does not preclude it from a vapor assessment. Any buildings that screen in based on other factors, such as proximity to residual VOC contamination in soil and/or groundwater, must be evaluated. WDNR does not allow preemptive mitigation of vapors in lieu of sampling, and the presence of a vapor barrier does not eliminate the need for a vapor evaluation. Vapor barrier information should be submitted to EPA and WDNR and should include the barrier's specifications as they pertain to mitigation of chemical VI and resistance to degradation by the contaminants of concern for the site, along with barrier installation documentation.*

**Tyco Response**.

The screening process is being updated to include buildings (regardless of whether there is current VOC usage) within 100 feet of a shallow groundwater monitoring well that has VOC concentrations greater than the VRSLs, or in an area of the site where VRSLs could potentially be exceeded, but no groundwater data are available (Attachment 4 with draft Figures 1 and 2).

Attachment 5 includes a draft summary of the buildings that are screened in based on these updated criteria. Two structures (Buildings 41/42 and 86) were originally screened out in the 2021 work plan because they were not considered to be occupied buildings in accordance with EPA's most recent VI guidance (EPA 2015);[2] however, based on feedback received by WDNR during the April 4, 2024 meeting, these buildings were revaluated and included:

- Building 41/42 (half open-air storage structure and half refrigerated storage): Based on the possible presence of TCE in this area, Tyco plans to include Building 41/42 as part of the investigation.
- Building 86 (pump house): Although this building was confirmed to be outside a radius of 100 feet from monitoring wells with VOC concentrations greater than the VRSL or TCE Preventive Action Limit (PAL), Tyco plans to include Building 86 as part of the VI investigation in consideration of its general location in the northwestern portion of the facility.

In addition, as stated in the response to Agencies Comment 1, the initial screening process will include an evaluation of preferential pathways using a HAPSITE GC/MS. As indicated previously, this assessment will also include sampling of indoor air to better understand the distribution of VOC concentrations in the indoor air of the buildings and to evaluate potential VOC contributions from background sources.

The work plan will be updated to clarify that the presence of a moisture/vapor barrier is provided as supplemental information and is not used to screen out the VI pathway at a building. A moisture/vapor barrier is present beneath Tyco Building 14 and ChemDesign Buildings 67 and 1. Additional details that are available will be included in the updated VI assessment and work plan for buildings that are proposed for additional assessment (Building 14).

3. Agencies Comment:

   *Use the most recent VOC data available including data from the 2023 sampling event. Tyco asserts that the total mass of VOCs is decreasing. To demonstrate the trends of all compounds, evaluate the total VOC mass and degradation by-products as additional data is collected.*

   **Tyco Response**.

   A draft table with the most recent shallow groundwater data (2023) is included as Attachment 6 and a final version will be included in the updated VI assessment and work plan. Concentrations of detected VOCs were compared against the groundwater VRSLs to determine which buildings should undergo further VI investigation.

   VOC trends in groundwater were evaluated as part of the 2023 five-year technical review report and concentration trends have not been used to screen out buildings.

4. Agencies Comment:

   *The attenuation factor used for each building should be based upon the media sampled, the building use (residential/commercial/industrial) and the proximity of the groundwater table to the building slab. Refer to WDNR guidance document RR-0136 for groundwater vapor risk screening levels (VRSLs).*

[2] EPA. 2015. *OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.* Office of Solid Waste and Emergency Response (OSWER), OSWER Publication 9200.2-154, June. https://www.epa.gov/sites/production/files/2015-09/documents/oswer-vapor-intrusion-technical-guide-final.pdf.

a. *WDNR includes attenuation factors for different media and building use. Each building should be evaluated for whether it would be considered residential, small commercial, or large commercial. Evaluation should include factors such as building size and use, ceiling heights, HVAC operations and air exchange rates, etc.*

b. *All calculations must be redone with the correct attenuation factors, and then the locations and list of analytes reevaluated based on the results.*

**Tyco Response**.

An evaluation was performed using Wisconsin VI guidance RR-800 (WDNR 2018)[3] and will be provided in the updated VI assessment and work plan. A draft version of the table that summarizes the buildings screened in is included as Attachment 5. Based on their use and size, all the buildings can be considered industrial or large commercial buildings, with the possible exception of Building 61 (Office trailer) and the guard shack (Building 9). Building 61 will be included in the initial HAPSITE assessment and follow-up conventional sampling. Building 9 is outside the area of potential VOC concerns regardless of attenuation factor. In consideration of the above, no additional attenuation factors (e.g., small commercial, residential) were needed beyond the attenuation factors associated with industrial/large commercial buildings.

5. Agencies Comment:

*EPA and WDNR are requesting that additional indoor air sampling be performed using passive samplers over a duration of 7 to 14 days, with 10 days being the preferred sampling duration. Samples should only be analyzed for contaminants of concern.*

a. *Provide sampling workplan(s) that include the building layout and construction, preferential pathways (e.g. utilities), proposed sampler type, sample locations, number of samples, and frequency of events (minimum of three events with one round performed during the heating season). If sump(s) are present, these should also be sealed with headspace vapor sample collected following the protocol in RR-986. A multiple lines of evidence approach must be taken when sub-slab sampling is not possible.*

i. *Please note that when the concentration of TCE in groundwater is greater than the Preventive Action Limit (PAL), and groundwater is in contact with the building foundation, indoor air sampling is required.*

**Tyco Response.**

Layout of buildings where sampling is planned will be provided in the updated VI assessment and work plan. Sampling locations may be modified during the initial HAPSITE assessment on the basis of the results obtained in real time.

As indicated in Attachment 2, the HAPSITE assessment results will be used to confirm the proposed conventional VI investigation locations to include indoor air and subslab vapor sampling (where subslab vapor sampling is possible) and locations for preferential pathway sampling. Consistent with Wisconsin guidance RR-800 (WDNR 2018), two to three sampling events, as needed, will be performed for analysis of the VOCs of concern, with one event taking place during the heating season.

[3] WDNR. 2018. *Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin, Wis. Stat. ch. 292; Wis. Admin. Code ch. NR 700.* RR-800, January. https://widnr.widen.net/s/xnmrpgkqqr.

Consistent with Wisconsin guidance, a technical explanation will be provided if fewer than two sampling events are used to rule out the VI pathway (WDNR 2018, see note [d] of Table 5c).

The PAL for TCE was compared against the shallow groundwater dataset obtained through 2023 (Attachment 6) (note this comparison was also done in the 2021 Work Plan). No buildings were present within 100 feet of a TCE PAL exceedance (Attachment 4) that were not already included from the evaluation of shallow groundwater concentrations exceeding the VRSLs.

6. Agencies Comment:

*Assumptions regarding the significance of VOC discharges including TCE at the site cannot be made.*

   a. *In 2018, the concentration of TCE in MW045M was 1,700 ppb. While VOC contamination in mid depth wells may not contribute to VI, site specific activities including groundwater pumping to prevent flooding, may impact the migration of contaminants from mid to shallow depths.*

   b. *Using a concentration of 100 ppm (2019) in one well does not demonstrate the scale of historical discharges or impacts considering the concentration in MW045M was 1,700 ppm.*

   c. *The statement on page 4, 3rd paragraph "…and the groundwater concentrations measured historically have not exceeded 100 ug/L." is false and should be removed. The assumption that no discharges to soil have occurred in the last two decades is similarly unsubstantiated.*

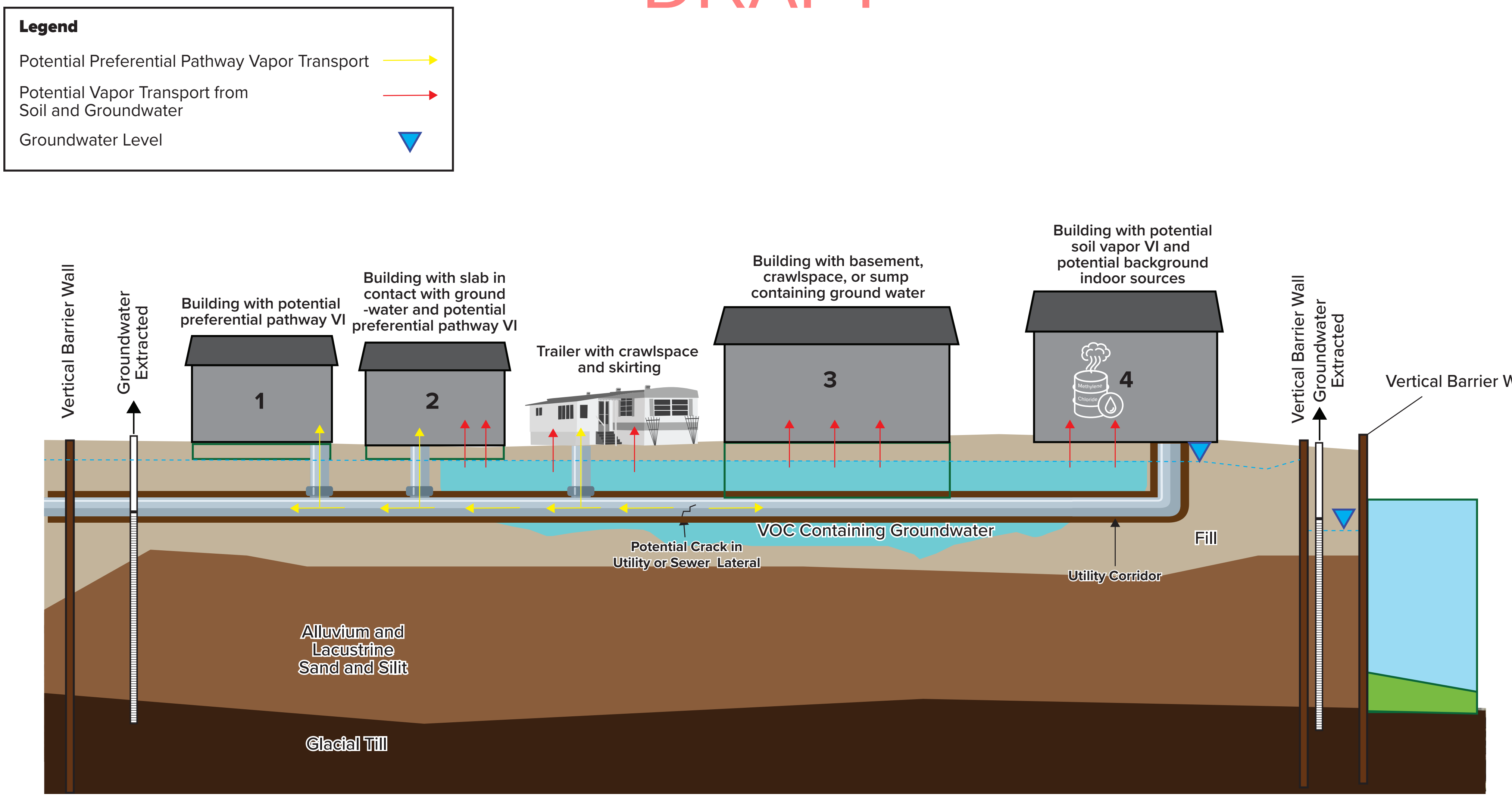
**Tyco Response**.

The TCE concentration at MW045M was 1,700 micrograms per liter (μg/L, which is equivalent to parts per billion [ppb]); however, the TCE concentration in the shallow nested monitoring well (MW045S) was 56 μg/L in 2018 and 27 μg/L in 2023, and the maximum TCE concentration measured in shallow groundwater samples was 100 μg/L (MW067S in 2019). There is no justification for using deeper groundwater concentrations for assessing VI when shallow water-table data are available at a given location; the shallow concentrations already reflect pumping effects, if any. For comparison, the available TCE concentrations in medium depth well groundwater data were reviewed and there were no medium depth locations with a TCE detection that did not also have a corresponding shallow well location that was already screened in for TCE.

The statement on page 4, 3$^{rd}$ paragraph, will be clarified to indicate that the 100 μg/L corresponds to the maximum concentration measured in shallow monitoring wells and the language regarding a significant TCE release or significant residual TCE mass in the subsurface will be removed.

# Attachment 1
# Draft Conceptual Site Model

DRAFT




**Notes:**
See definitions in Wisconsin Department of Natural Resources RR-649 for preferential pathway, utility lateral, and utility corridor
VI = vapor intrusion
VOC = volatile organic compound

**Attachment 1. Vapor Intrusion Conceptual Site Model**
Tyco Fire Products LP
Marinette, WI

Jacobs

# Attachment 2
# Proposed Work Plan Approach

# Proposed Vapor Intrusion Work Plan Approach

1. **Real-time Vapor Intrusion (VI) Assessment - Portable GC/MS (HAPSITE) Assessment**
    a. HAPSITE Assessment Tasks
        i. Collect and evaluate concentrations of volatile organic compounds (VOCs) in indoor air of identified buildings with potential VI (8 buildings)
        ii. Identify/verify background VOC indoor sources
        iii. Preferential pathway investigation, in alignment with Wisconsin Department of Natural Resources (WDNR) June 2021 guidance RR-649
            1) Sample potential VI-entry points associated with utility conduits (e.g., drains)
            2) Sample vapor from sumps or areas (e.g., crawlspace) that may contain groundwater using an approach analogous to the RR-986 protocol (WDNR 2014).
            3) Sample vapor in exterior manholes (within 100 feet of VOC-containing groundwater)
                (a) Potentially step out to more distant manholes based on real-time data
    b. Objectives
        i. Fine tune conventional VI sampling approach and provide information to inform next steps
        ii. Determine if background VOC sources are present at concentrations in indoor air that may interfere with conventional sampling
        iii. Assess if 10-day passive sampling requested by U.S. Environmental Protection Agency (EPA) and WDNR is feasible (potential for sorbent saturation)
        iv. Assess direct groundwater volatilization pathway, if present (sumps or crawlspace with water)
        v. Determine if further preferential pathway sampling is necessary
        vi. As part of assessment, confirm building configuration/construction
2. **Conventional VI sampling to be conducted based on HAPSITE data**
    a. Indoor/outdoor air sampling – Locations to be confirmed based on HAPSITE assessment (8-hour canister or 10-day passive samples based on HAPSITE results)
    b. Subslab vapor sampling – For buildings requiring VI sampling, where possible (if groundwater is not in contact with slab and if slab is not used for secondary containment)
    c. Groundwater sampling – In sumps or crawlspaces, where present
    d. Preferential pathway sampling – Additional sampling, as needed, based on the findings of HAPSITE investigation
    e. Two to three sampling events, including one heating season event, per EPA and WDNR request (number of events to be adjusted based on results and consistent with WDNR guidance)

# Attachment 3
# Draft Vapor Intrusion VOC HAPSITE Analyte List

DRAFT

**Attachment 3. Draft Vapor Intrusion VOC HAPSITE Analyte List**

*Tyco Fire Products LP, Marinette, Wisconsin*

| Volatile Organic Compounds | Indoor Air VAL ($\mu g/m^3$) | Sewer Gas Screening Level ($\mu g/m^3$) | Sewer Gas Screening Level ($\mu g/m^3$) | HAPSITE Reporting Limit ($\mu g/m^3$) | Does the analyte's maximum concentration in shallow GW exceed its GW VRSLs? | Is the analyte actively used at the facility by ChemDesign? | Is the analyte a breakdown compound of TCE? | Retain as HAPSITE analyte?* |
|---|---|---|---|---|---|---|---|---|
| **Petroleum VOCs in Groundwater** | | | | | | | | |
| Benzene | 16 | 520 | 52 | 0.16 | No | No | No | No |
| Ethylbenzene | 49 | 1,600 | 160 | 0.22 | Yes | No | No | Yes |
| Naphthalene | 3.6 | 120 | 12 | 0.53 | No | No | No | No |
| Toluene | 22,000 | 730,000 | 73,000 | 0.19 | No | Yes | No | Yes |
| Xylenes (o-xylene and m- & p-xylene) | 440 | 15,000 | 1,500 | 0.44 | Yes | Yes | No | Yes |
| **Chlorinated VOCs in Groundwater** | | | | | | | | |
| Chlorobenzene | 220 | 7,300 | 730 | 0.23 | No | Yes | No | Yes |
| Chloromethane | 390 | 13,000 | 1,300 | May not be detectable | No | No | No | No |
| 1,2-Dichlorobenzene | 880 | 29,000 | 2,900 | 0.31 | No | No | No | No |
| 1,4-Dichlorobenzene | 11 | 370 | 37 | 0.31 | No | No | No | No |
| 1,2-Dichloroethane | 4.7 | 160 | 16 | 0.21 | No | No | No | No |
| cis-1,2-Dichloroethene | 180 | 5,800 | 580 | 0.2 | No | No | Yes | Yes |
| Methylene Chloride | 2,600 | 88,000 | 8,800 | 0.18 | No | Yes | No | Yes |
| Trichloroethene (TCE) | 8.8 | 290 | 29 | 0.27 | Yes | No | No | Yes |
| Vinyl chloride | 28 | 930 | 93 | 0.26 | No | No | Yes | Yes |

Notes:

Constituents possibly attributable to ChemDesign spills

VAL - Vapor Action Level

VOC - volatile organic compound

VRSLs - vapor risk screening levels

GW - groundwater

$\mu g/m^3$ - micrograms per cubic meter

VAL Source

https://widnr.widen.net/s/fvhcjvxrfs

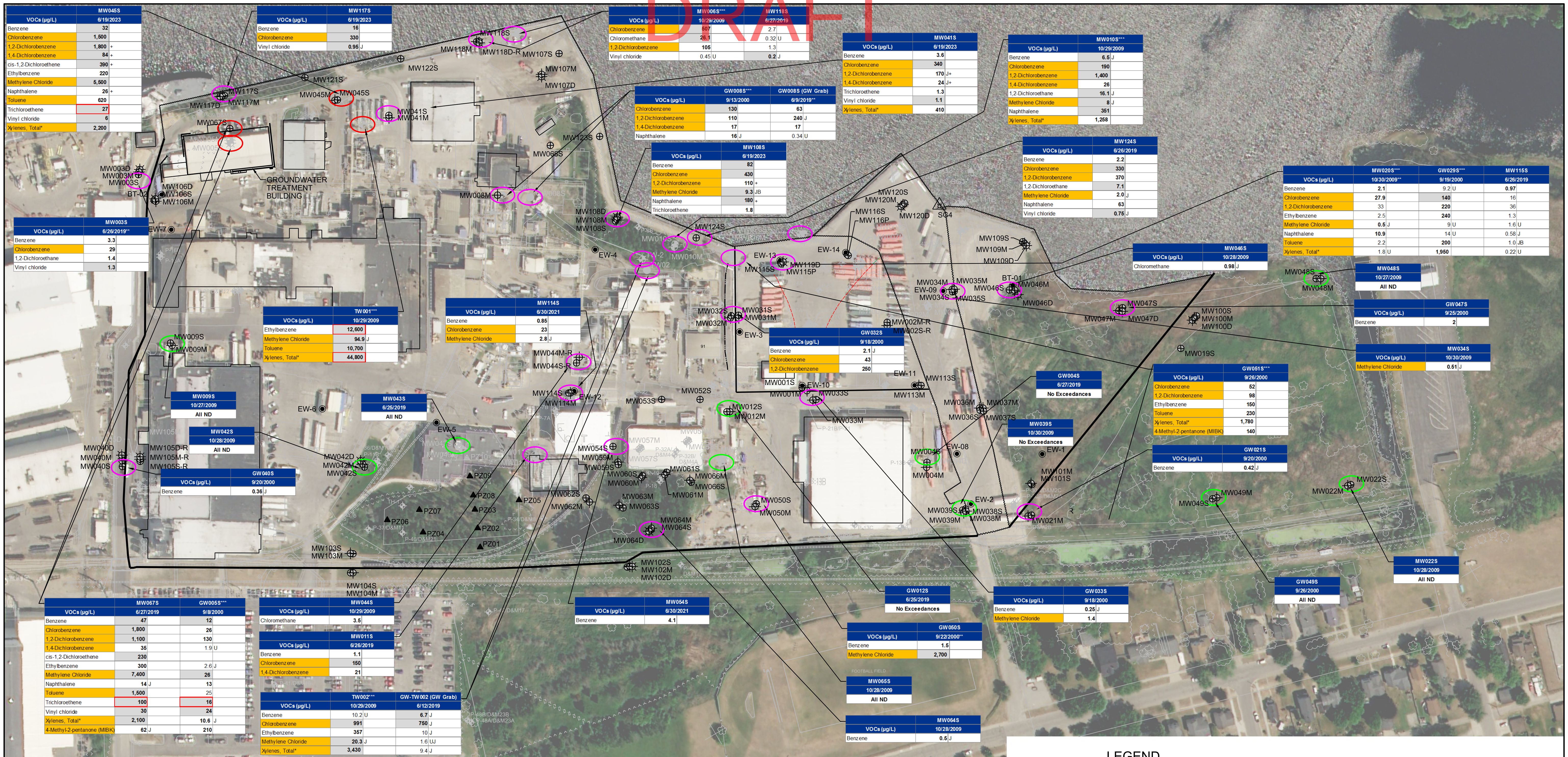
Sewer gas screening level based on the indoor air VAL and an attenuation factor of 0.03

* Analytes in the HAPSITE list include the following: (1) analytes for which groundwater concentrations exceed GW VRSLs, (2) analytes that are chemical currently used at the facility, or (3) analytes that are a breakdown of TCE

Not proposed for HAPSITE

# Attachment 4
# Draft Figures 1 and 2

DRAFT




| VOCs (µg/L) | MW045S 6/19/2023 | |
|---|---|---|
| Benzene | 32 | |
| Chlorobenzene | 1,500 | |
| 1,2-Dichlorobenzene | 1,800 | + |
| 1,4-Dichlorobenzene | 84 | + |
| cis-1,2-Dichloroethene | 390 | + |
| Ethylbenzene | 220 | |
| Methylene Chloride | 5,500 | |
| Naphthalene | 26 | + |
| Toluene | 620 | |
| Trichloroethene | 27 | |
| Vinyl chloride | 6 | |
| Xylenes, Total* | 2,200 | |

| VOCs (µg/L) | MW117S 6/19/2023 | |
|---|---|---|
| Benzene | 16 | |
| Chlorobenzene | 330 | |
| Vinyl chloride | 0.95 | J |

| VOCs (µg/L) | MW006S*** 10/29/2009 | | MW118S 6/27/2019 | |
|---|---|---|---|---|
| Chlorobenzene | 507 | | 2.7 | |
| Chloromethane | 26.1 | | 0.32 | U |
| 1,2-Dichlorobenzene | 105 | | 1.3 | |
| Vinyl chloride | 0.45 | U | 0.2 | J |

| VOCs (µg/L) | MW041S 6/19/2023 | |
|---|---|---|
| Benzene | 3.6 | |
| Chlorobenzene | 340 | |
| 1,2-Dichlorobenzene | 170 | J+ |
| 1,4-Dichlorobenzene | 24 | J+ |
| Trichloroethene | 1.3 | |
| Vinyl chloride | 1.1 | |
| Xylenes, Total* | 410 | |

| VOCs (µg/L) | MW010S*** 10/29/2009 | |
|---|---|---|
| Benzene | 6.5 | J |
| Chlorobenzene | 190 | |
| 1,2-Dichlorobenzene | 1,400 | |
| 1,4-Dichlorobenzene | 26 | |
| 1,2-Dichloroethane | 16.1 | J |
| Methylene Chloride | 8 | J |
| Naphthalene | 351 | |
| Xylenes, Total* | 1,258 | |

| VOCs (µg/L) | GW008S*** 9/13/2000 | | GW008S (GW Grab) 6/9/2019** | |
|---|---|---|---|---|
| Chlorobenzene | 130 | | 63 | |
| 1,2-Dichlorobenzene | 110 | | 240 | J |
| 1,4-Dichlorobenzene | 17 | | 17 | |
| Naphthalene | 16 | J | 0.34 | U |

| VOCs (µg/L) | MW108S 6/19/2023 | |
|---|---|---|
| Benzene | 82 | |
| Chlorobenzene | 430 | |
| 1,2-Dichlorobenzene | 110 | + |
| Methylene Chloride | 9.3 | JB |
| Naphthalene | 180 | + |
| Trichloroethene | 1.8 | |

| VOCs (µg/L) | MW124S 6/26/2019 | |
|---|---|---|
| Benzene | 2.2 | |
| Chlorobenzene | 330 | |
| 1,2-Dichlorobenzene | 370 | |
| 1,2-Dichloroethane | 7.1 | |
| Methylene Chloride | 2.0 | J |
| Naphthalene | 63 | |
| Vinyl chloride | 0.75 | J |

| VOCs (µg/L) | MW020S*** 10/30/2009** | | GW029S*** 9/19/2000 | | MW115S 6/26/2019 | |
|---|---|---|---|---|---|---|
| Benzene | 2.1 | | 9.2 | U | 0.97 | |
| Chlorobenzene | 27.9 | | 140 | | 16 | |
| 1,2-Dichlorobenzene | 33 | | 220 | | 36 | |
| Ethylbenzene | 2.5 | | 240 | | 1.3 | |
| Methylene Chloride | 0.5 | J | 9 | U | 1.6 | U |
| Naphthalene | 10.9 | | 14 | U | 0.58 | J |
| Toluene | 2.2 | | 200 | | 1.0 | JB |
| Xylenes, Total* | 1.8 | U | 1,950 | | 0.22 | U |

| VOCs (µg/L) | MW003S 6/26/2019** | |
|---|---|---|
| Benzene | 3.3 | |
| Chlorobenzene | 29 | |
| 1,2-Dichloroethane | 1.4 | |
| Vinyl chloride | 1.3 | |

| VOCs (µg/L) | MW046S 10/28/2009 | |
|---|---|---|
| Chloromethane | 0.98 | J |

| MW048S |
|---|
| 10/27/2009 |
| All ND |

| VOCs (µg/L) | GW047S 9/25/2000 | |
|---|---|---|
| Benzene | 2 | |

| VOCs (µg/L) | TW001*** 10/29/2009 | |
|---|---|---|
| Ethylbenzene | 12,600 | |
| Methylene Chloride | 94.9 | J |
| Toluene | 10,700 | |
| Xylenes, Total* | 44,800 | |

| VOCs (µg/L) | MW114S 6/30/2021 | |
|---|---|---|
| Benzene | 0.85 | |
| Chlorobenzene | 23 | |
| Methylene Chloride | 2.8 | J |

| VOCs (µg/L) | GW032S 9/18/2000 | |
|---|---|---|
| Benzene | 2.1 | J |
| Chlorobenzene | 43 | |
| 1,2-Dichlorobenzene | 250 | |

| VOCs (µg/L) | MW034S 10/30/2009 | |
|---|---|---|
| Methylene Chloride | 0.51 | J |

| GW004S |
|---|
| 6/27/2019 |
| No Exceedances |

| VOCs (µg/L) | GW051S*** 9/26/2000 | |
|---|---|---|
| Chlorobenzene | 52 | |
| 1,2-Dichlorobenzene | 98 | |
| Ethylbenzene | 150 | |
| Toluene | 230 | |
| Xylenes, Total* | 1,780 | |
| 4-Methyl-2-pentanone (MIBK) | 140 | |

| MW039S |
|---|
| 10/30/2009 |
| No Exceedances |

| VOCs (µg/L) | GW021S 9/20/2000 | |
|---|---|---|
| Benzene | 0.42 | J |

| MW009S |
|---|
| 10/27/2009 |
| All ND |

| MW043S |
|---|
| 6/25/2019 |
| All ND |

| MW042S |
|---|
| 10/28/2009 |
| All ND |

| VOCs (µg/L) | GW040S 9/20/2000 | |
|---|---|---|
| Benzene | 0.36 | J |

| VOCs (µg/L) | MW067S 6/27/2019 | | GW005S*** 9/8/2000 | |
|---|---|---|---|---|
| Benzene | 47 | | 12 | |
| Chlorobenzene | 1,800 | | 26 | |
| 1,2-Dichlorobenzene | 1,100 | | 130 | |
| 1,4-Dichlorobenzene | 35 | | 1.9 | U |
| cis-1,2-Dichloroethene | 230 | | | |
| Ethylbenzene | 300 | | 2.6 | J |
| Methylene Chloride | 7,400 | | 26 | |
| Naphthalene | 14 | J | 13 | |
| Toluene | 1,500 | | 25 | |
| Trichloroethene | 100 | | 16 | |
| Vinyl chloride | 30 | | 24 | |
| Xylenes, Total* | 2,100 | | 10.6 | J |
| 4-Methyl-2-pentanone (MIBK) | 62 | J | 210 | |

| VOCs (µg/L) | MW044S 10/29/2009 | |
|---|---|---|
| Chloromethane | 3.5 | |

| VOCs (µg/L) | MW011S 6/26/2019 | |
|---|---|---|
| Benzene | 1.1 | |
| Chlorobenzene | 150 | |
| 1,4-Dichlorobenzene | 21 | |

| VOCs (µg/L) | TW002*** 10/29/2009 | | GW-TW002 (GW Grab) 6/12/2019 | |
|---|---|---|---|---|
| Benzene | 10.2 | U | 6.7 | J |
| Chlorobenzene | 991 | | 750 | J |
| Ethylbenzene | 357 | | 10 | J |
| Methylene Chloride | 20.3 | J | 1.6 | UJ |
| Xylenes, Total* | 3,430 | | 9.4 | J |

| VOCs (µg/L) | MW054S 6/30/2021 | |
|---|---|---|
| Benzene | 4.1 | |

| GW012S |
|---|
| 6/25/2019 |
| No Exceedances |

| VOCs (µg/L) | GW033S 9/18/2000 | |
|---|---|---|
| Benzene | 0.25 | J |
| Methylene Chloride | 1.4 | |

| VOCs (µg/L) | GW050S 9/22/2000** | |
|---|---|---|
| Benzene | 1.5 | |
| Methylene Chloride | 2,700 | |

| MW065S |
|---|
| 10/28/2009 |
| All ND |

| VOCs (µg/L) | MW064S 10/28/2009 | |
|---|---|---|
| Benzene | 0.5 | J |

| GW049S |
|---|
| 9/26/2000 |
| All ND |

| MW022S |
|---|
| 10/28/2009 |
| All ND |

| MW013S |
|---|
| 10/27/2009 |
| All ND |

SCALE IN FEET (0, 100, 200, 300)

## LEGEND

- EW-5 OR BT-02 — EXTRACTION WELL OR TEST WELL
- MW002S OR MW115P — MONITORING WELL - SHALLOW OR PEAT
- MW002M — MONITORING WELL - MEDIUM
- MW002D — MONITORING WELL - DEEP (BEDROCK)
- PZ04 — PIEZOMETER
- VW-TB01 — VIBRATING WIRE PIEZOMETER
- SG1 — STAFF GAUGE
- WELLS PREVIOUSLY ABANDONED OR DESTROYED
- SHEET PILE WALL
- SLURRY WALL
- NO PAL OR VRSL EXCEEDANCES
- PAL EXCEEDANCE(S)
- SHALLOW WATER TABLE VRSL EXCEEDANCE(S)
- INDUSTRIAL AND SHALLOW WATER TABLE VRSL EXCEEDANCE(S)
- GROUNDWATER GRAB SAMPLE LOCATION

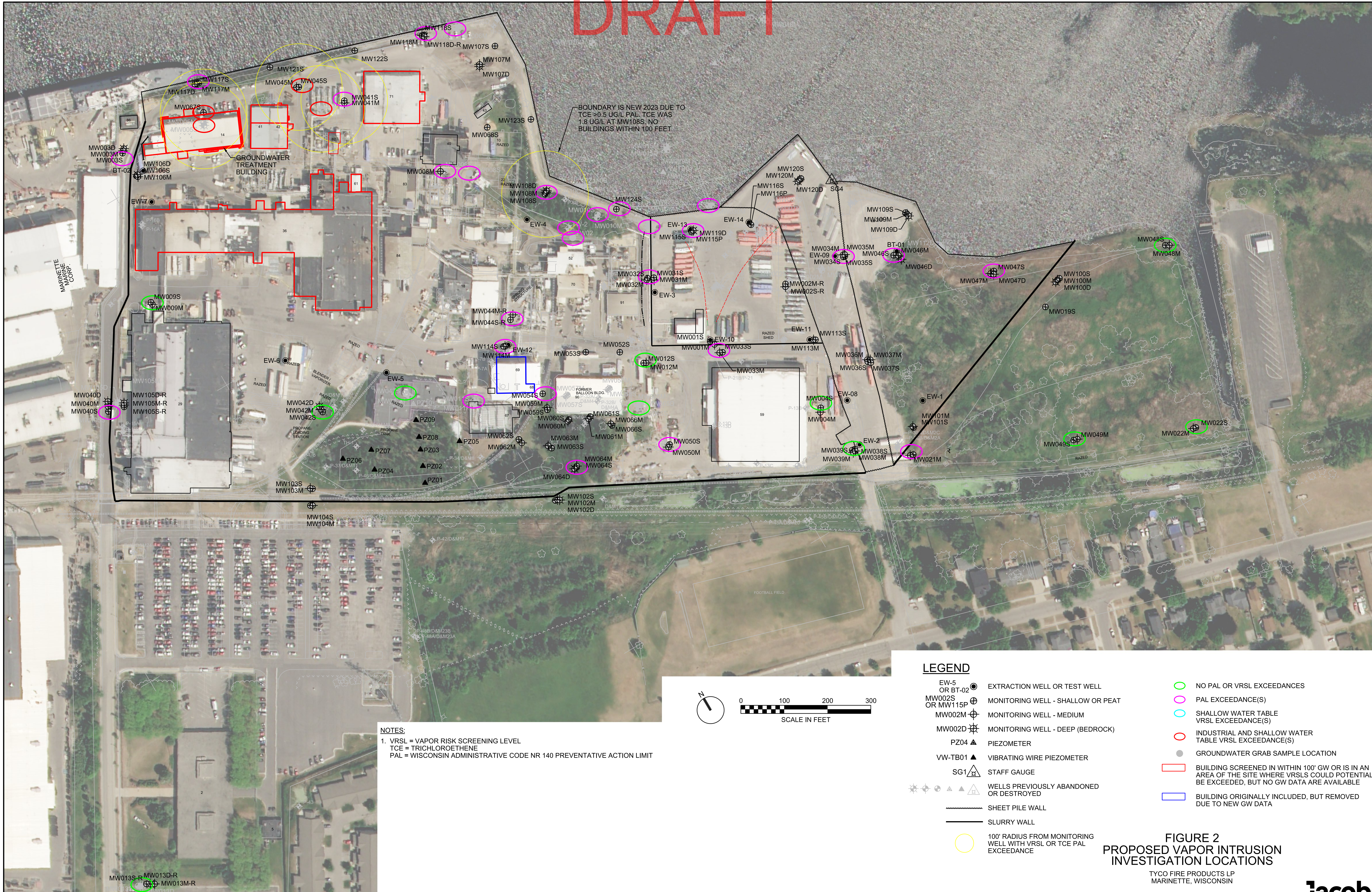
NOTES:

1. VRSL = VAPOR RISK SCREENING LEVEL
   J - INDICATES THE ANALYTE WAS POSITIVELY IDENTIFIED AND THE ASSOCIATED NUMERICAL VALUE IS THE APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.
   U - INDICATES THE ANALYTE WAS ANALYZED FOR BUT WAS NOT DETECTED ABOVE THE METHOD DETECTION LIMIT.
   ALL ND - ALL VOC RESULTS WERE NON DETECT.
   * XYLENES, TOTAL DATA FOR 200 AND 2009 ARE THE SUM OF THE META-, ORTHO-, AND PARA-XYLENE COMBINED OR THE RESULT OF THE DETECTED RESULT IF THE OTHERS WERE NON-DETECT OR THE HIGHEST NON-DETECT RESULT IF ALL WERE NON-DETECT.
   ** MAX VALUE BETWEEN PRIMARY AND DUPLICATE SAMPLES WAS REPORTED.
   *** WELL ABANDONED OR NOT VIABLE, ALTERNATIVE NEARBY WELL OR GROUNDWATER GRAB SAMPLE COLLECTED TO REPLACE OLDER DATA.
   GW005S - NEARBY REPLACEMENT MW067S
   TW001 - NEARBY REPLACEMENT MW041S AND MW045S
   MW006S - NEARBY REPLACEMENT MW118S
   GW008S - GROUNDWATER GRAB SAMPLE
   TW002 - TW002 GROUNDWATER GRAB SAMPLE
   MW010S - TW002 GROUNDWATER GRAB AND MW124S
   MW051S - NEARBY REPLACEMENT MW124S
   MW020S AND GW029S - NEARBY REPLACEMENT MW115S
   +ANALYTE WAS NOT SAMPLED IN 2023, RESULT SHOWN IS FROM PREVIOUS SAMPLING EVENT.
2. MICROGRAMS PER LITER.
3. BOLDED VALUES INDICATE ATTAINMENT OR EXCEEDANCE OF THE WISCONSIN ADMINISTRATIVE CODE (WAC) NR 140 PREVENTATIVE ACTION LIMIT (PAL).
4. BLUE BORDER EXCEEDS SHALLOW WATER TABLE VR SL SCREENING CRITERIA (ADJUSTMENT FOR RISK TO 10-5, AND TEMPERATURE, AND MODIFIED INDUSTRIAL GROUNDWATER ATTENUATION FACTOR TO ACCOUNT FOR SHALLOW WATER TABLE 10-3).
5. RED BORDER EXCEEDS INDUSTRIAL VRSL SCREENING CRITERIA (ADJUSTMENT FOR RISK TO 10-5, TEMPERATURE, AND INDUSTRIAL GROUNDWATER ATTENUATION FACTOR 10-4) AND THE SHALLOW WATER TABLE VRSL.
6. YELLOW SHADING INDICATES CONSTITUENTS POSSIBLY ATTRIBUTABLE TO CHEMDESIGN SPILLS.

# FIGURE 1
# VAPOR INTRUSION ASSESSMENT LOCATIONS

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN

Jacobs




NOTES:

1. VRSL = VAPOR RISK SCREENING LEVEL
   TCE = TRICHLOROETHENE
   PAL = WISCONSIN ADMINISTRATIVE CODE NR 140 PREVENTATIVE ACTION LIMIT

0 100 200 300

SCALE IN FEET

## LEGEND

| | |
|---|---|
| EW-5 OR BT-02 | EXTRACTION WELL OR TEST WELL |
| MW002S OR MW115P | MONITORING WELL - SHALLOW OR PEAT |
| MW002M | MONITORING WELL - MEDIUM |
| MW002D | MONITORING WELL - DEEP (BEDROCK) |
| PZ04 | PIEZOMETER |
| VW-TB01 | VIBRATING WIRE PIEZOMETER |
| SG1 | STAFF GAUGE |
| | WELLS PREVIOUSLY ABANDONED OR DESTROYED |
| | SHEET PILE WALL |
| | SLURRY WALL |
| | 100' RADIUS FROM MONITORING WELL WITH VRSL OR TCE PAL EXCEEDANCE |
| | NO PAL OR VRSL EXCEEDANCES |
| | PAL EXCEEDANCE(S) |
| | SHALLOW WATER TABLE VRSL EXCEEDANCE(S) |
| | INDUSTRIAL AND SHALLOW WATER TABLE VRSL EXCEEDANCE(S) |
| | GROUNDWATER GRAB SAMPLE LOCATION |
| | BUILDING SCREENED IN WITHIN 100' GW OR IS IN AN AREA OF THE SITE WHERE VRSLS COULD POTENTIALLY BE EXCEEDED, BUT NO GW DATA ARE AVAILABLE |
| | BUILDING ORIGINALLY INCLUDED, BUT REMOVED DUE TO NEW GW DATA |

# FIGURE 2
# PROPOSED VAPOR INTRUSION INVESTIGATION LOCATIONS

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN

Jacobs

FILENAME: Figure2_04-2024_D3235600.dgn PLOT DATE: 8/30/2024 PLOT TIME: 5:39:38 AM

# Attachment 5
# Draft Building Screening Summary

DRAFT

**Attachment 5. Summary of Buildings to Include in Initial Vapor Intrusion Investigation**

*Tyco Fire Products LP, Marinette, Wisconsin*

| Building/VI Category | Building No. | General Usage | Type of Work Performed within the Building | Occupancy (# of occupants, hours in the building) | VOCs Exceeding VRSLs or TCE PAL in Nearby Groundwater | Include in VI Investigation |
|---|---|---|---|---|---|---|
| Building is within 100 feet of a groundwater well with VOCs > VRSLs, or is in an area of the site where VRSLs could potentially be exceeded, but no groundwater data are available | 14 | Groundwater collection and treatment system and wastewater treatment plant for facility | Treatment system operations and maintenance. | 3 staff, 1 per shift to cover 24 hours/5 to 7 days per week, other maintenance staff as needed. Women of child bearing age. | Yes | Yes |
| | 36 | Small parts manufacturing - fire extinguishers | Manufacturing two processes: century and red line (both are fire extinguishers) | 60 to 70 people per 8 hour shift. 5 days a week, 3 shifts a day. Includes women of child bearing age. | Potentially | Yes |
| | 38 | Dryer, centrifuge and reaction vessel | Chemical processing | 9 people per shift, two 12 hour shifts | Potentially | Yes |
| | 41/42 | Industrial, chemical storage - B41 is an open air structure, and B42 is a refrigeration unit | Storage of chemical drums, totes and other chemical containers - 50 pound bags, 300 gallon totes, etc. | 0 staff (<1 hour per day), used as storage location | Yes | Yes |
| | 61 | Engineering building - Trailer | Offices, no chemical storage - supply room of safety supplies | 1 person during office hours | Potentially | Yes |
| | 62 | Manufacturing - recycling solvents | Transfer of solvents and distillations | 1 staff, < 6 hours/day | Yes | Yes |
| | 71 | Administrative and maintenance | 1/3 mailroom, 1/3 office space, 1/3 maintenance shop.<br>Spray painting in maintenance shop. | 10 staff, 8 hours in the building Monday through Friday. Women of child bearing age. | Yes | Yes |
| | 86 | Former pump house for pumping river water to fire sprinkler system and other buildings, currently houses the booster pump for the fire system (all city water now) with a diesel pump that will be abandoned in the future | Two rooms: pump house and diesel backup generator | None, occasional maintenance only. No offices or bathrooms. | Potentially | Yes |
| Originally included as a building to be included in the VI investigation, but recent ground water data collected as part of the original workplan are below VRSLs | 69 | Specialty chemical manufacturing | 4 batches of chemicals including VOCs are made here - no offices | Manufacturing: 2 shifts of 4 people (12 hour shifts) | No | No |

Highlighted yellow = included in March 2021 work plan
VOCs = volatile organic compounds
TCE = trichloroethene
PAL = Wisconsin Administrative Code NR 140 Preventative Action Limit
VI = vapor intrusion
VRSL = vapor risk screening level

# Attachment 6
# Draft Groundwater Assessment Table

**Attachment 6. Volatile Organic Compound Analytical Data - Shallow Groundwater**

*Tyco Fire Products LP, Marinette, Wisconsin*

Main Plant Along River from West to East

| VOCs (µg/L) | WDNR PAL | WDNR ES | WDNR Adjusted Industrial VRSL | Shallow Water Table VRSL | Max Conc | MW067S | GW005S*** | MW117S | | MW045S | | TW001*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 6/27/2019 | 9/8/2000 | 6/27/2019 | 6/19/2023 | 5/3/2018 | 6/19/2023 | 10/29/2009 |
| Benzene | 0.5 | 5 | 1,360 | 136 | 82 | 47 | 12 | 22 | 16 | 76 | 32 | 51.2 U |
| Chlorobenzene | 20 | 100 | 39,300 | 3,930 | 1,800 | 1,800 | 26 | 370 | 330 | 3,800 | 1,500 | 51.2 U |
| Chloroform | 0.6 | 6 | 663 | 66.3 | 0.45 | 7.4 U | 1.7 U | 0.74 U | 0.37 U | 7.4 U | 0.37 U | 162 U |
| Chloroethane | 80 | 400 | 622,000 | 62,200 | 4.4 | 10 U | 7.3 U | 1.0 U | 0.51 U | | 0.51 U | 121 U |
| Chloromethane | 0.3 | 3 | 15,900 | 1,590 | 82.1 | 6.4 U | 1.8 U | 0.64 U | 0.32 U | | 0.32 U | 30 U |
| 1,2-Dichlorobenzene | 60 | 600 | 294,000 | 29,400 | 1,800 | 1,100 | 130 | 38 | | 1,800 | | 104 U |
| 1,3-Dichlorobenzene | 120 | 600 | | | 13 | 8.0 U | 2 U | 0.80 U | | 13 J | | 109 U |
| 1,4-Dichlorobenzene | 15 | 75 | 2,990 | 299 | 84 | 35 | 1.9 U | 3.7 | | 84 | | 119 U |
| Dichlorodifluoromethane | 200 | 1,000 | 435 | 43.5 | 19 | 13 U | 1.7 U | 1.3 U | 1.9 J | 13 U | 0.67 U | 124 U |
| 1,2-Dichloroethane | 0.5 | 5 | 1,990 | 199 | 16 | 7.8 U | 2.1 U | 0.78 U | 0.39 U | 18 J | 0.39 U | 45 U |
| cis-1,2-Dichloroethene | 7 | 70 | 20,000 | 2,000 | 390 | 230 | | 1.8 J | | 390 | | |
| trans-1,2-Dichloroethene | 20 | 100 | 8,380 | 838 | 1.8 | 7.0 U | 1.8 U | 1.3 J | 0.51 J | 7 U | 1.8 | 111 U |
| Isopropyl ether | | | 562,000 | 56,200 | 2.5 | | | | | 5.5 U | | |
| Ethylbenzene | 140 | 700 | 3,590 | 359 | 12,600 | 300 | 2.6 J | 7.4 | 2.8 | 1,200 | 220 | 12,600 |
| Isopropylbenzene (Cumene) | | | 110,000 | 11,000 | 9.2 | | | | | 7.7 U | | |
| p-Isopropyltoluene | | | | | 8.5 | | | | | 8.5 J | | |
| Methylene Chloride | 0.5 | 5 | 353,000 | 35,300 | 7,400 | 7,400 | 26 | 3.3 U | 1.6 U | 110 | 5,500 | 94.9 J |
| Methyl tert-butyl ether | 12 | 60 | 358,000 | 35,800 | 0.64 | | | | | 7.9 U | | |
| Naphthalene | 10 | 100 | 6,010 | 601 | 351 | 14 J | 13 | 0.67 U | | 26 | | 111 U |
| Toluene | 160 | 800 | 1,740,000 | 174,000 | 10,700 | 1,500 | 25 | 1.1 JB | 1 JB | 3,900 | 620 | 10,700 |
| Trichloroethene | 0.5 | 5 | 5 | 5 | 100 | 100 | 16 | 0.33 U | 0.2 J | 56 | 27 | 60 U |
| Vinyl chloride | 0.02 | 0.2 | 355 | 35.5 | 30 | 30 | 24 | 1.5 J | 0.95 J | 32 | 6 | 22.5 U |
| Xylenes, Total* | 400 | 2,000 | 38,200 | 3,820 | 44,800 | 2,100 | 10.6 J | 1.7 J | 0.94 J | 7,600 | 2,200 | 44,800 |
| Carbon disulfide | 200 | 1,000 | 89,900 | 8,990 | 1.3 | 9.0 U | 1.7 U | 0.90 U | 0.45 U | 9 U | 0.71 J | 82.5 U |
| Acetone | 1,800 | 9,000 | | | 1,500 | 1,500 | 55 U | 3.5 U | 10 UB | 3,900 | 680 | 624 U |
| 4-Methyl-2-pentanone (MIBK) | 50 | 500 | 53,200,000 | 5,320,000 | 210 | 62 J | 210 | 4.3 U | 2.2 U | 130 | 32 | 150 U |
| 2-Butanone (MEK) | 800 | 4,000 | 190,000,000 | 19,000,000 | 38 | 42 U | 8.9 U | 4.2 U | 2.1 U | 130 | 20 | 538 U |

| VOCs (µg/L) | MW041S | | MW006S*** | MW118S | GW008S*** | GW008S (GW Grab) | MW108S | | TW002*** | TW002 (GW Grab) | MW010S*** | MW124S | GW051S*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5/3/2018** | 6/19/2023 | 10/29/2009 | 6/27/2019 | 9/13/2000 | 6/9/2019** | 6/27/2019 | 6/19/2023 | 10/29/2009 | 6/12/2019 | 10/29/2009 | 6/26/2019 | 9/26/2000 |
| Benzene | 48 J | 3.6 | 1 U | 0.15 U | 2.9 U | 0.15 U | 86 | 82 | 10.2 U | 6.7 J | 6.5 J | 2.2 | 9.2 U |
| Chlorobenzene | 1,500 J | 340 | 507 | 2.7 | 130 | 63 | 210 | 430 | 991 | 750 J | 190 | 330 | 52 |
| Chloroform | 7.4 UJ | 0.37 U | 3.2 U | 0.37 U | 4.3 U | 0.37 U | 0.37 U | 0.37 U | 32.5 U | 0.37 UJ | 13 U | 0.37 U | 8.6 U |
| Chloroethane | 10 UJ | 0.51 U | 2.4 U | 0.51 U | 11 U | 0.51 U | 0.51 U | 0.51 U | 24.2 U | 0.51 UJ | 9.7 U | 0.51 U | 37 U |
| Chloromethane | 6.4 UJ | 0.32 U | 26.1 | 0.32 U | 2.3 U | 0.32 U | 0.32 U | 0.32 U | 6 U | 0.32 UJ | 82.1 | 0.32 U | 9 U |
| 1,2-Dichlorobenzene | 170 J | | 105 | 1.3 | 110 | 240 J | 110 | | 20.8 U | 4.5 J | 1,400 | 370 | 98 |
| 1,3-Dichlorobenzene | 8 UJ | | 2.2 U | 0.40 U | 2 U | 1.3 | 0.40 U | | 21.8 U | 0.40 UJ | 8.7 U | 0.76 J | 10 U |
| 1,4-Dichlorobenzene | 24 J | | 9.7 | 0.36 U | 17 | 17 | 0.36 U | | 23.8 U | 0.36 UJ | 26 | 8.5 | 9.4 U |
| Dichlorodifluoromethane | 13 UJ | 0.86 J | 2.5 U | 0.67 U | 8.2 J | 14.0 | 0.67 U | 0.67 U | 24.8 U | 0.67 UJ | 9.9 U | 1.1 J | 8.4 U |
| 1,2-Dichloroethane | 7.8 UJ | 0.39 U | 0.9 U | 0.39 U | 3.6 U | 0.39 U | 0.39 U | 0.39 U | 9 U | 0.39 UJ | 16.1 J | 7.1 | 10 U |
| cis-1,2-Dichloroethene | 8.2 UJ | | | 0.41 U | | 0.41 U | 0.41 U | | | 0.41 UJ | | 0.41 U | |
| trans-1,2-Dichloroethene | 7 UJ | 0.44 J | 2.2 U | 0.35 U | 3.8 U | 0.35 U | 0.35 U | 0.35 U | 22.2 U | 0.35 UJ | 8.9 U | 0.35 U | 9.2 U |
| Isopropyl ether | 5.5 UJ | | | | | | | | | | | | |
| Ethylbenzene | 1,500 J | 77 | 1.4 U | 0.18 U | 2.3 U | 0.18 U | 16 | 51 | 357 | 10 J | 133 | 8.5 | 150 |
| Isopropylbenzene (Cumene) | 9.2 J | | | | | | | | | | | | |
| p-Isopropyltoluene | 7.2 UJ | | | | | | | | | | | | |
| Methylene Chloride | 33 UJ | 1.6 U | 1.1 U | 1.6 U | 4.3 U | 1.6 U | 10 | 9.3 JB | 20.3 J | 1.6 UJ | 8 J | 2.0 J | 9 U |
| Methyl tert-butyl ether | 7.9 UJ | | | | | | | | | | | | |
| Naphthalene | 6.7 UJ | | 2.2 U | 0.34 U | 16 J | 0.34 U | 180 | | 22.2 U | 0.34 UJ | 351 | 63 | 14 U |
| Toluene | 52 J | 5.4 | 1.7 U | 0.16 JB | 3.6 U | 28 | 5.8 | 5.3 | 16.8 U | 6.0 J | 131 | 2.8 JB | 230 |
| Trichloroethene | 3.3 UJ | 1.3 | 1.2 U | 0.16 U | 3.2 U | 0.16 U | 0.16 U | 1.8 | 12 U | 0.16 UJ | 4.8 U | 0.16 U | 8.4 U |
| Vinyl chloride | 4.1 UJ | 1.1 | 0.45 U | 0.20 J | 2.8 U | 0.20 U | 0.20 U | 0.2 U | 4.5 U | 0.20 UJ | 1.8 U | 0.75 J | 7.7 U |
| Xylenes, Total* | 9,100 J | 410 | 4.5 U | 0.22 U | 4.6 U | 0.22 U | 46 | 53 | 3,430 | 9.4 J | 1,258 | 160 | 1,780 |
| Carbon disulfide | 9 UJ | 0.45 U | 1.6 U | 0.45 U | 3.7 U | 0.45 U | 0.97 J | 1.3 J | 16.5 U | 0.45 UJ | 6.6 U | 0.57 J | 8.6 U |
| Acetone | 35 UJ | 31 | 12.5 U | 15 | 110 U | 190 J | 110 | 13 JB | 125 U | 80 J | 668 | 1.7 U | 500 |
| 4-Methyl-2-pentanone (MIBK) | 43 J | 2.2 U | 3 U | 2.2 U | 12 U | 2.2 U | 3.4 J | 2.2 U | 30 U | 2.2 UJ | 12 U | 2.9 J | 140 |
| 2-Butanone (MEK) | 42 UJ | 2.1 U | 10.8 U | 2.1 U | 23 UR | 2.1 U | 2.6 J | 2.1 U | 108 U | 5.4 J | 43 U | 2.1 U | 44 U |

Notes:

µg/L = micrograms per liter

WDNR PAL = Wisconsin Administrative Code (WAC) NR 140 Preventative Action Limit

WDNR ES = Wisconsin Administrative Code (WAC) NR 140 Enforcement Standard

VRSL = Vapor risk screening level

VOC = volatile organic compound

Max Conc = maximum dected concentration based on most recent data from each monitoring well location

J indicates the analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

U indicates the analyte was analyzed for but was not detected above the method detection limit.

R indicates rejected data. The presence or absence of the analyte cannot be verified.

Bolded values indicate attainment or exceedance of the Wisconsin Administrative Code (WAC) NR 140 Preventative Action Limit (PAL).

Bolded and gray shaded values indicate attainment or exceedance of WAC NR 140 Enforcement Standard

Blank cells indicate the well was not sampled for that compound

2009 data is from the "baseline" event

2000 data was collected by URS Corporation (URS) as part of the 2000 *RCRA Facility Investigation* (URS 2001)

*Xylenes, Total data for 2000 and 2009 are the sum of the meta–, ortho–, and para–xylene combined or the result of the detected result if the others were non-detect or the highest non-detect result if all were non-detect

**Max value between primary and duplicate samples was reported

***Well abandoned or not viable, alternative nearby well or groundwater grab sample collected to replace older data

GW005S - nearby replacement MW067S

TW001 - nearby replacement MW041S and MW045S

MW006S - nearby replacement MW118S

GW008S - groundwater grab sample

TW002 - TW002 groundwater grab

MW010S - TW002 groundwater grab and MW124S

MW051S - nearby replacement MW124S

MW020S and GW029S - nearby replacement MW115S

Blue shading or border exceeds shallow water table VRSL screening criteria (adjustment for risk to $10^{-5}$, and temperature of 10°C, and modified industrial groundwater attenuation factor to account for shallow water table $10^{-3}$)

Red shading or border exceeds Industrial VRSL screening criteria (adjustment for risk to $10^{-5}$, temperature of 10°C, and industrial groundwater attenuation factor $10^{-4}$)

Constituents possibly attributable to ChemDesign spills

**Attachment 6. Volatile Organic Compound Analytical Data - Shallow Groundwater**

*Tyco Fire Products LP, Marinette, Wisconsin*

| VOCs (µg/L) | WDNR PAL | WDNR ES | WDNR Adjusted Industrial VRSL | Shallow Water Table VRSL | Max Conc | Main Plant Western Boundary | | | Main Plant Southern Boundary and Interior Locations from West to East | | | | | | | | | | | | | | Background |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MW003S | MW009S | GW040S | MW042S | MW043S | MW011S | MW114S | MW044S | MW054S | MW064S | MW065S | GW012S | GW032S | GW050S | GW033S | GW004S | MW039S | MW013S |
| | | | | | | 6/26/2019** | 10/27/2009 | 9/20/2000 | 10/28/2009 | 6/25/2019 | 6/26/2019 | 6/30/2021 | 10/29/2009 | 6/30/2021** | 10/28/2009 | 10/28/2009 | 6/25/2019 | 9/18/2000 | 9/22/2000** | 9/18/2000 | 6/27/2019 | 10/30/2009 | 10/27/2009 |
| Benzene | **0.5** | 5 | 1,360 | 136 | 82 | **3.3** | 0.41 U | **0.36** J | 0.41 U | 0.15 U | **1.1** | **0.85** | 0.41 U | **4.1** | **0.5** J | 0.41 U | 0.29 J | **2.1** J | **1.5** | **0.25** J | 0.15 U | 0.41 U | 0.41 U |
| Chlorobenzene | **20** | 100 | 39,300 | 3,930 | 1,800 | **29** | 0.41 U | 0.13 U | 0.41 U | 0.39 U | **150** | **23** | 0.41 U | 0.39 U | 0.41 U | 0.41 U | 0.77 J | **43** | 0.74 UJ | 0.13 U | 6.5 | 13.4 | 0.41 U |
| Chloroform | 0.6 | 6 | 663 | 66.3 | 0.45 | 0.37 U | 1.3 U | 0.21 U | 1.3 U | 0.37 U | 0.37 U | 0.37 U | 1.3 U | 0.37 U | 1.3 U | 1.3 U | 0.37 U | 2.1 U | 0.45 J | 0.21 U | 0.37 U | 1.3 U | 1.3 U |
| Chloroethane | 80 | 400 | 622,000 | 62,200 | 4.4 | 0.51 U | 0.97 U | 0.75 J | 0.97 U | 0.51 U | 0.51 U | 4.4 | 0.97 U | 0.51 U | 0.97 U | 0.97 U | 0.51 U | 5.7 U | 0.57 U | 0.57 U | 0.51 U | 0.97 U | 0.97 U |
| Chloromethane | **0.3** | 3 | 15,900 | 1,590 | 82.1 | 0.32 U | 0.24 U | 0.12 U | 0.24 U | 0.32 U | 0.32 U | 0.32 U | **3.5** | 0.32 U | 0.24 U | 0.24 U | 0.32 U | 1.2 U | 0.12 U | 0.12 U | 0.32 U | 0.24 U | 0.24 U |
| 1,2-Dichlorobenzene | **60** | 600 | 294,000 | 29,400 | 1,800 | 1.4 | 0.83 U | 0.2 UJ | 0.83 U | 0.33 U | 25 | 1.6 | 0.83 U | 0.33 U | 0.83 U | 0.83 U | 9.6 | **250** | 0.27 UJ | 20 | 0.43 J | 1.4 | 0.83 U |
| 1,3-Dichlorobenzene | 120 | 600 | | | 13 | 0.40 U | 0.87 U | 0.1 U | 0.87 U | 0.40 U | 1.8 | 0.40 U | 0.87 U | 0.40 U | 0.87 U | 0.87 U | 0.40 U | 1.5 J | 0.1 U | 1.5 | 0.40 U | 0.87 U | 0.87 U |
| 1,4-Dichlorobenzene | **15** | 75 | 2,990 | 299 | 84 | 0.36 U | 0.95 U | 0.13 U | 0.95 U | 0.36 U | **21** | 0.36 U | 0.95 U | 0.36 U | 0.95 U | 0.95 U | 0.36 U | 4.9 | 0.13 U | 7.2 | 0.80 J | 0.95 U | 0.95 U |
| Dichlorodifluoromethane | 200 | 1,000 | 435 | 43.5 | 19 | 0.67 U | 0.99 U | 0.13 U | 0.99 U | 0.67 U | 0.67 U | 0.67 U | 0.99 U | 1.2 J | 0.99 U | 0.99 U | 19 | 2.7 J | 0.13 U | 0.13 U | 0.67 U | 0.99 U | 0.99 U |
| 1,2-Dichloroethane | **0.5** | 5 | 1,990 | 199 | 16 | **1.4** | 0.36 U | 0.18 U | 0.36 U | 0.39 U | 0.39 U | 0.39 U | 0.36 U | 0.39 U | 0.36 U | 0.36 U | 0.39 U | 1.8 U | 0.18 U | 0.18 U | 0.39 U | 0.36 U | 0.36 U |
| cis-1,2-Dichloroethene | **7** | 70 | 20,000 | 2,000 | 390 | 2.4 | | | | 0.41 U | 0.41 U | 0.41 U | | 0.41 U | | | 0.43 J | | | | 0.41 U | | |
| trans-1,2-Dichloroethene | 20 | 100 | 8,380 | 838 | 1.8 | 0.35 U | 0.89 U | 0.19 U | 0.89 U | 0.35 U | 0.35 U | 0.35 U | 0.89 U | 0.35 U | 0.89 U | 0.89 U | 0.35 U | 1.9 U | 0.19 U | 0.19 U | 0.35 U | 0.89 U | 0.89 U |
| Isopropyl ether | | | 562,000 | 56,200 | 2.5 | | | | | | | 2.5 | | 0.28 U | | | | | | | | | |
| Ethylbenzene | **140** | 700 | 3,590 | 359 | 12,600 | 0.97 | 0.54 U | 0.12 U | 0.54 U | 0.18 U | 0.18 U | 0.19 J | 0.54 U | 0.18 U | 0.54 U | 0.54 U | 0.18 U | 2.6 J | 0.78 | 0.14 J | 0.18 U | 0.54 U | 0.54 U |
| Isopropylbenzene (Cumene) | | | 110,000 | 11,000 | 9.2 | | | | | | | 0.39 U | | 0.39 U | | | | | | | | | |
| p-Isopropyltoluene | | | | | 8.5 | | | | | | | 0.90 J | | 0.36 U | | | | | | | | | |
| Methylene Chloride | **0.5** | 5 | 353,000 | 35,300 | 7,400 | 1.6 U | 0.43 U | 0.22 U | 0.43 U | 1.6 U | 1.6 U | **2.8** J | 0.43 U | 1.6 U | 0.43 U | 0.43 U | 1.6 U | 2.2 U | **2,700** | **1.4** | 1.6 U | 0.43 U | 0.43 U |
| Methyl tert-butyl ether | 12 | 60 | 358,000 | 35,800 | 0.64 | | | | | | | 0.64 J | | 0.39 U | | | | | | | | | |
| Naphthalene | **10** | 100 | 6,010 | 601 | 351 | 0.37 J | 0.89 U | 0.34 J | 0.89 U | 0.34 U | 0.34 U | 0.34 U | 0.89 U | 0.34 U | 0.89 U | 0.89 U | 0.34 U | 2.3 U | 0.23 U | 2.7 | 0.50 JB | 0.89 U | 0.89 U |
| Toluene | **160** | 800 | 1,740,000 | 174,000 | 10,700 | 0.39 JB | 0.67 U | 0.3 UJ | 0.67 U | 0.15 U | 0.38 JB | 1.1 | 0.67 U | 0.15 U | 0.67 U | 0.67 U | 0.15 U | 1.8 U | 1.6 | 65 | 0.15 U | 0.67 U | 0.67 U |
| Trichloroethene | **0.5** | 5 | 5 | 5 | 100 | 0.16 U | 0.48 U | 0.16 U | 0.48 U | 0.16 U | 0.16 U | 0.16 U | 0.48 U | 0.16 U | 0.48 U | 0.48 U | 0.16 U | 1.6 U | 0.16 U | 0.16 U | 0.16 U | 0.48 U | 0.48 U |
| Vinyl chloride | **0.02** | 0.2 | 355 | 35.5 | 30 | **1.3** | 0.18 U | 0.14 U | 0.18 U | 0.20 U | 0.20 U | 0.20 U | 0.18 U | 0.20 U | 0.18 U | 0.18 U | 0.20 U | 1.4 U | 0.14 U | 0.14 U | 0.20 U | 0.18 U | 0.18 U |
| Xylenes, Total* | **400** | 2,000 | 38,200 | 3,820 | 44,800 | 0.33 JB | 1.8 U | 0.41 J | 1.8 U | 0.22 U | 0.23 JB | 0.67 J | 1.8 U | 0.29 J | 1.8 U | 1.8 U | 0.22 U | 2.3 U | 0.23 U | 0.32 J | 0.22 U | 1.8 U | 1.8 U |
| Carbon disulfide | 200 | 1,000 | 89,900 | 8,990 | 1.3 | 0.45 U | 0.66 U | 0.18 U | 0.66 U | 0.45 U | 0.45 U | | 0.66 U | | 0.66 U | 0.66 U | 0.45 U | 1.8 U | 0.18 U | 0.18 U | 0.45 U | 0.66 U | 0.66 U |
| Acetone | 1,800 | 9,000 | | | 1,500 | 14 J | 5 U | 5.5 U | 5 U | 1.7 U | 1.7 U | | 5 U | | 5 U | 5 U | 1.7 U | 160 | 330 | 21 | 1.7 U | 5 U | 5 U |
| 4-Methyl-2-pentanone (MIBK) | **50** | 500 | 53,200,000 | 5,320,000 | 210 | 2.2 U | 1.2 U | 0.58 U | 1.2 U | 2.2 U | 2.2 U | | 1.2 U | | 1.2 U | 1.2 U | 2.2 U | 43 | 0.82 J | 0.58 U | 2.2 U | 1.2 U | 1.2 U |
| 2-Butanone (MEK) | 800 | 4,000 | 190,000,000 | 19,000,000 | 38 | 2.1 U | 4.3 U | 1.1 UR | 4.3 U | 2.1 U | 2.1 U | | 4.3 U | | 4.3 U | 4.3 U | 2.1 U | 11 UR | 38 J | 1.7 J | 2.1 U | 4.3 U | 4.3 U |

Notes:

µg/L = micrograms per liter

WDNR PAL = Wisconsin Administrative Code (WAC) NR 140 Preventative Action Limit

WDNR ES = Wisconsin Administrative Code (WAC) NR 140 Enforcement Standard

VRSL = Vapor risk screening level

VOC = volatile organic compound

Max Conc = maximum dected concentration based on most recent data from each monitoring well location

J indicates the analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

U indicates the analyte was analyzed for but was not detected above the method detection limit.

R indicates rejected data. The presence or absence of the analyte cannot be verified.

Bolded values indicate attainment or exceedance of the Wisconsin Administrative Code (WAC) NR 140 Preventative Action Limit (PAL).

Bolded and gray shaded values indicate attainment or exceedance of WAC NR 140 Enforcement Standard

Blank cells indicate the well was not sampled for that compound

2009 data is from the "baseline" event

2000 data was collected by URS Corporation (URS) as part of the 2000 *RCRA Facility Investigation* (URS 2001)

*Xylenes, Total data for 2000 and 2009 are the sum of the meta−, ortho−, and para−xylene combined or the result of the detected result if the others were non-detect or the highest non-detect result if all were non-detect

**Max value between primary and duplicate samples was reported

***Well abandoned or not viable, alternative nearby well or groundwater grab sample collected to replace older data

GW005S - nearby replacement MW067S

TW001 - nearby replacement MW041S and MW045S

MW006S - nearby replacement MW118S

GW008S - groundwater grab sample

TW002 - TW002 groundwater grab

MW010S - TW002 groundwater grab and MW124S

MW051S - nearby replacement MW124S

MW020S and GW029S - nearby replacement MW115S

Blue shading or border exceeds shallow water table VRSL screening criteria (adjustment for risk to $10^{-5}$, and temperature of 10°C, and modified industrial groundwater attenuation factor to account for shallow water table $10^{-3}$)

Red shading or border exceeds Industrial VRSL screening criteria (adjustment for risk to $10^{-5}$, temperature of 10°C, and industrial groundwater attenuation factor $10^{-4}$)

Constituents possibly attributable to ChemDesign spills

**Attachment 6. Volatile Organic Compound Analytical Data - Shallow Groundwater**

*Tyco Fire Products LP, Marinette, Wisconsin*

| | | | | | | Former Salt Vault | | | Former 8th St | Wetlands Area | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WDNR PAL | WDNR ES | WDNR Adjusted Industrial VRSL | Shallow Water Table VRSL | Max Conc | MW020S*** | GW029S*** | MW115S | MW034S | GW021S | MW046S | GW047S | GW049S | MW022S | MW048S |
| VOCs (µg/L) | | | | | | 10/30/2009** | 9/19/2000 | 6/26/2019 | 10/30/2009 | 9/20/2000 | 10/28/2009 | 9/25/2000 | 9/26/2000 | 10/28/2009 | 10/27/2009 |
| Benzene | **0.5** | 5 | 1,360 | 136 | 82 | **2.1** | 9.2 U | **0.97** | 0.41 U | **0.42** J | 0.41 U | **2** | 0.18 U | 0.41 U | 0.41 U |
| Chlorobenzene | **20** | 100 | 39,300 | 3,930 | 1,800 | **27.9** | **140** | 16 | 0.41 U | 0.13 U | 0.41 U | 0.19 U | 0.19 U | 0.41 U | 0.41 U |
| Chloroform | 0.6 | 6 | 663 | 66.3 | 0.45 | 1.3 U | 8.6 U | 0.37 U | 1.3 U | 0.21 U | 1.3 U | 0.17 U | 0.17 U | 1.3 U | 1.3 U |
| Chloroethane | 80 | 400 | 622,000 | 62,200 | 4.4 | 0.97 U | 37 U | 0.51 U | 0.97 U | 0.57 U | 0.97 U | 0.73 U | 0.73 U | 0.97 U | 0.97 U |
| Chloromethane | **0.3** | 3 | 15,900 | 1,590 | 82.1 | 0.24 U | 9 U | 0.32 U | 0.24 U | 0.12 U | **0.98** J | 0.18 U | 0.18 U | 0.24 U | 0.24 U |
| 1,2-Dichlorobenzene | **60** | 600 | 294,000 | 29,400 | 1,800 | 33 | **220** | 36 | 0.83 U | 0.15 UJ | 0.83 U | 0.18 U | 0.18 U | 0.83 U | 0.83 U |
| 1,3-Dichlorobenzene | 120 | 600 | | | 13 | 0.87 U | 10 U | 0.40 U | 0.87 U | 0.1 U | 0.87 U | 0.2 U | 0.2 U | 0.87 U | 0.87 U |
| 1,4-Dichlorobenzene | **15** | 75 | 2,990 | 299 | 84 | 0.95 U | 9.4 U | 0.36 U | 0.95 U | 0.13 U | 0.95 U | 0.19 U | 0.19 U | 0.95 U | 0.95 U |
| Dichlorodifluoromethane | 200 | 1,000 | 435 | 43.5 | 19 | 5.2 | 8.4 U | 0.67 U | 0.99 U | 0.13 U | 0.99 U | 0.17 U | 0.17 U | 0.99 U | 0.99 U |
| 1,2-Dichloroethane | **0.5** | 5 | 1,990 | 199 | 16 | 0.36 U | 10 U | 0.39 U | 0.36 U | 0.18 U | 0.36 U | 0.21 U | 0.21 U | 0.36 U | 0.36 U |
| cis-1,2-Dichloroethene | **7** | 70 | 20,000 | 2,000 | 390 | | | 0.41 U | | | | | | | |
| trans-1,2-Dichloroethene | 20 | 100 | 8,380 | 838 | 1.8 | 0.89 U | 9.2 U | 0.35 U | 0.89 U | 0.19 U | 0.89 U | 0.18 U | 0.18 U | 0.89 U | 0.89 U |
| Isopropyl ether | | | 562,000 | 56,200 | 2.5 | | | | | | | | | | |
| Ethylbenzene | **140** | 700 | 3,590 | 359 | 12,600 | 2.5 | **240** | 1.3 | 0.54 U | 0.12 U | 0.54 U | 1.2 | 0.21 U | 0.54 U | 0.54 U |
| Isopropylbenzene (Cumene) | | | 110,000 | 11,000 | 9.2 | | | | | | | | | | |
| p-Isopropyltoluene | | | | | 8.5 | | | | | | | | | | |
| Methylene Chloride | **0.5** | 5 | 353,000 | 35,300 | 7,400 | **0.5** J | 9 U | 1.6 U | **0.51** J | 0.22 U | 0.43 U | 0.18 U | 0.18 U | 0.43 U | 0.43 U |
| Methyl tert-butyl ether | 12 | 60 | 358,000 | 35,800 | 0.64 | | | | | | | | | | |
| Naphthalene | **10** | 100 | 6,010 | 601 | 351 | **10.9** | 14 U | 0.58 J | 0.89 U | 0.23 U | 0.89 U | 0.29 U | 0.29 U | 0.89 U | 0.89 U |
| Toluene | **160** | 800 | 1,740,000 | 174,000 | 10,700 | 2.2 | **200** | 1.0 JB | 0.67 U | 0.23 U | 0.67 U | 0.35 UJ | 0.35 UJ | 0.67 U | 0.67 U |
| Trichloroethene | **0.5** | 5 | 5 | 5 | 100 | 0.48 U | 8.4 U | 0.16 U | 0.48 U | 0.16 U | 0.48 U | 0.17 U | 0.17 U | 0.48 U | 0.48 U |
| Vinyl chloride | **0.02** | 0.2 | 355 | 35.5 | 30 | 0.18 U | 7.7 U | 0.20 U | 0.18 U | 0.14 U | 0.18 U | 0.15 U | 0.15 U | 0.18 U | 0.18 U |
| Xylenes, Total* | **400** | 2,000 | 38,200 | 3,820 | 44,800 | 1.8 U | **1,950** | 0.22 U | 1.8 U | 0.23 U | 1.8 U | 0.58 J | 0.39 U | 1.8 U | 1.8 U |
| Carbon disulfide | 200 | 1,000 | 89,900 | 8,990 | 1.3 | 0.66 U | 8.6 U | 0.45 U | 0.66 U | 0.18 U | 0.66 U | 0.17 U | 0.17 U | 0.66 U | 0.66 U |
| Acetone | 1,800 | 9,000 | | | 1,500 | 35.1 U | 470 | 28 J | 5 U | 5.5 U | 5 U | 5.5 U | 5.5 U | 5 U | 5 U |
| 4-Methyl-2-pentanone (MIBK) | **50** | 500 | 53,200,000 | 5,320,000 | 210 | 1.2 U | 20 J | 2.2 U | 1.2 U | 0.58 U | 1.2 U | 0.19 U | 0.19 U | 1.2 U | 1.2 U |
| 2-Butanone (MEK) | 800 | 4,000 | 190,000,000 | 19,000,000 | 38 | 4.3 U | 44 U | 2.1 U | 4.3 U | 1.1 UR | 4.3 U | 0.89 U | 0.89 U | 4.3 U | 4.3 U |

Notes:

µg/L = micrograms per liter

WDNR PAL = Wisconsin Administrative Code (WAC) NR 140 Preventative Action Limit

WDNR ES = Wisconsin Administrative Code (WAC) NR 140 Enforcement Standard

VRSL = Vapor risk screening level

VOC = volatile organic compound

Max Conc = maximum dected concentration based on most recent data from each monitoring well location

J indicates the analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

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Bolded values indicate attainment or exceedance of the Wisconsin Administrative Code (WAC) NR 140 Preventative Action Limit (PAL).

Bolded and gray shaded values indicate attainment or exceedance of WAC NR 140 Enforcement Standard

Blank cells indicate the well was not sampled for that compound

2009 data is from the "baseline" event

2000 data was collected by URS Corporation (URS) as part of the 2000 *RCRA Facility Investigation* (URS 2001)

*Xylenes, Total data for 2000 and 2009 are the sum of the meta–, ortho–, and para–xylene combined or the result of the detected result if the others were non-detect or the highest non-detect result if all were non-detect

**Max value between primary and duplicate samples was reported

***Well abandoned or not viable, alternative nearby well or groundwater grab sample collected to replace older data

GW005S - nearby replacement MW067S

TW001 - nearby replacement MW041S and MW045S

MW006S - nearby replacement MW118S

GW008S - groundwater grab sample

TW002 - TW002 groundwater grab

MW010S - TW002 groundwater grab and MW124S

MW051S - nearby replacement MW124S

MW020S and GW029S - nearby replacement MW115S

Blue shading or border exceeds shallow water table VRSL screening criteria (adjustment for risk to $10^{-5}$, and temperature of 10°C, and modified industrial groundwater attenuation factor to account for shallow water table $10^{-3}$)

Red shading or border exceeds Industrial VRSL screening criteria (adjustment for risk to $10^{-5}$, temperature of 10°C, and industrial groundwater attenuation factor $10^{-4}$)

Constituents possibly attributable to ChemDesign spills