Interim Progress Report

Nor-Lake Inc.
891 Hwy U
Hudson, WI
BRRTS # 02-56-000089

Prepared for:

Nor-Lake Inc.
727 2nd Street
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Nor-Lake Inc.
891 Hwy U
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Introduction

This Interim Progress Report provides information in response to the Wisconsin Department of Natural Resources' (WDNR) *Case Closure under Wis. Admin. Code ch. NR 726 Not Recommended* letter dated September 29, 2020 (WDNR Response Letter). Information presented in this report includes results from the Sub-Slab Vapor Investigation which supplements or supersedes information presented in Ayres' *Sub-Slab Vapor Investigation Report* dated December 2019, evaluation of the potential for 1,4-Dioxane at the site, and an update on routine maintenance activities to be completed in 2021 on some of the remaining 40 active residential carbon filter units.

Additional Vapor Investigation

Clarification of Map Features (Item #2c-d)

The black dots and triangular lines with distances from Figure 2 in the December 2019 vapor report have been omitted from the most recent vapor drawings because they are not necessary as supporting information. The black dots represented soil borings and were originally depicted on the Figure 1 Site Plan in the September 1992 Work Plan for the soil vapor extraction system. However, the current figure (Appendix B) depicts the same layout of the former septic system features, namely the septic tank, dry well, and associated perforated drainpipe.

Samples VS-1, VS-2, and VS-7, along with all other sub-slab vapor samples, were collected from the open manufacturing area and loading dock area. The locations of VS-1 and VS-2 are approximately six inches away from walls which divide the office area from the open manufacturing area. Although, no sub-slab vapor samples were collected from the adjacent office space, the results from VS-1 and VS-2 samples are representative of sub-slab vapor levels beneath the office area given their proximity (within one foot) to the office walls. The attached revised Figure B.4.a (Appendix B) depicts these sample locations after being recently verified.

Vapor Risk Screening Level Selection (Item #1)

The attached vapor analytical results table (Appendix A) has been updated to include current vapor risk screening levels (VRSLs) for large commercial/industrial settings. Large commercial/Industrial VRSLs have been selected as the applicable VRSLs because the site contains an approximately 250,000-square foot slab-on-grade facility which has been used for industrial manufacturing and warehousing since the 1960s with no foreseeable change in this setting. The Town of Hudson has assigned industrial zoning to the site and there are no residential uses of the site.

Demographics (Item #2a)

Per Section 3.4.1 of WDNR Guidance RR-800, there is a potential need to prioritize investigative and remedial action when trichloroethene (TCE) vapors are present because of a possible acute risk of fetal heart malformation that may occur when a pregnant mother is exposed to TCE vapors during the first trimester of pregnancy. The guidance further states that "When TCE is a contaminant of concern, the demographics of potential receptors should be determined as soon as possible, and sampling at homes/locations with women of childbearing age that are within the screening distances, should be made a priority."

The presence of TCE in soil vapor at the site does warrant consideration of this demographic, as women of childbearing age are employed at the site facility along with other working-age adults. The 2014 EPA Region 9 memorandum referenced in RR-800 specifies an Interim Accelerated Response Action Level of 8 $\mu g/m^3$ and Urgent Response Action Level of 24 $\mu g/m^3$ in a commercial/industrial exposure scenario with an 8-hour workday, with more stringent action levels of 7 µg/m^3 and 21 µg/m^3, respectively, with a 10-hour workday.

The maximum TCE concentration observed in sub-slab vapor during the investigation was 424 µg/m^3 followed by 257 and 249 µg/m^3. With a WDNR standard attenuation factor of 0.01 applied to sub-slab vapor concentrations at large commercial/industrial facilities, this yields a maximum, worst-case anticipated concentration of only 4.2 µg/m^3 in indoor air, well within the applicable Interim Response Action Levels referenced in the EPA memo. Furthermore, none of the 10 sub-slab vapor sampling points have consistently exceeded a VRSL for TCE over four rounds of monitoring. Therefore, the existing sub-slab vapor monitoring data strongly indicates that indoor air is unlikely to be impacted, let alone at high enough concentrations to warrant prioritized actions for this demographic.

Indoor Air (Item #2a-b)

The WDNR Response Letter indicates there is a need to evaluate indoor air quality in bathrooms because sub-slab vapor data exceeds the applicable non-residential vapor action level (VAL) for TCE (*i.e.,* 8.76 µg/m^3), underlying small, occupied spaces where there is the potential for a preferential pathway. The letter also indicates a need to evaluate indoor air in the adjacent offices because the office area overlies a perforated drainpipe associated with the former dry well and septic tank, which may also act as a preferential pathway.

Upon consideration of concerns raised in the response letter and further evaluation of the site setting and features, indoor air sampling of these areas is not warranted for the following reasons:

- As established during four rounds of sub-slab sampling at the source area and immediately proximate to the enclosed office area, concentrations of TCE and other compounds in sub-slab vapor are consistently below the large commercial/industrial VRSLs that area applicable to the site facility. Therefore, the existing slab should attenuate contaminant concentrations by a factor of 0.01, resulting in concentrations less than applicable VALs for indoor air unless a preferential pathway allows sub-slab vapors at concentrations exceeding VALs to enter indoor air without being significantly attenuated by the slab.

- Although the perforated drainpipe associated with the former dry well and septic tank intersects the source area and is routed below the office area, this feature does not provide a direct conduit to indoor air because it does not penetrate the slab underlying the office area and vapor contaminant concentrations within the drainpipe corridor should be no higher than has been monitored at 10 points at the source area, including two points immediately outside of the office area. Therefore, even if sub-slab concentrations were to exceed VALs protective of indoor air quality, which to clarify, none of the samples collected exceed VALS, the sub-slab TCE concentrations in the office area should be sufficiently attenuated by the slab before reaching indoor air. The exposure pathway is not complete.

- Former sewer piping between the former septic tank and current bathrooms may potentially provide a preferential pathway for sub-slab contaminant concentrations exceeding VALs at the source area to reach indoor air in the bathrooms without attenuation by the slab. However, bathroom occupants are expected to occupy the space for only a few minutes per day. The potential exposure window in this scenario is well short of the eight-hour worker exposure assumption that is used by the EPA to set Regional Screening Levels and subsequently the WDNR VALs.

Potential Off-Site Receptors (Item #3)

Vapor intrusion screening, including a review of site investigation data, indicates that further investigation of potential vapor intrusion at off-site receptors is not warranted. Figure 3a of WDNR Guidance RR-800 states that vapor investigation is recommended if (1) a building is within 100 feet of impacted soil, (2) a building overlies groundwater exceeding an NR 140 enforcement standard (ES), (3) groundwater contamination exceeding an NR 140 preventive action limit (PAL) has entered a building or is in contact with a building foundation, and (4) a utility line transects a chlorinated vapor source area. None of these conditions are present off-site.

In December 2020, Ayres evaluated the potential for vapor migration conduits by working with public and private utility locating services to map corridors that intersect the vapor source area and then network off-site. Such utilities include only unlikely conduits such as natural gas, electric, and communications lines (not larger storm or sanitary sewers). The attached revised Figure B.4.a depicts these public network utility corridors in addition to estimated extents of soil and groundwater impacts. As depicted in the figure, there are no known areas in which the industrial TCE VRSL is exceeded in sub-slab vapor.

Further evaluation of off-site vapor receptors is not necessary for the following reasons:

- As depicted in Attachment B.2.a.b in the closure request, the only buildings within 100 feet of soil contamination are the Nor-Lake manufacturing building and two small outbuildings (*i.e.,* flammable liquid storage building and gas house) which are normally not occupied by humans. There is no off-site soil contamination warranting investigation of vapor at off-site receptors.

- As depicted in Attachment B.3.b.c.d in the closure request, the only building overlying groundwater contamination exceeding an ES is the Nor-Lake manufacturing building and there are no ES exceedances that extend off-site. Similarly, although a plume of TCE in groundwater exceeding the NR 140 PAL extends well to the northwest of the site, the contaminated groundwater is not entering off-site buildings nor is it in contact with off-site building foundations. The depth to groundwater measured from the top of monitoring well casings vary from approximately 21.72 feet to 193.32 feet and is therefore well below the foundation depths of any potential receptor buildings.

- Although natural gas and electric utility corridors intersect the approximate extent of on-site residual soil contamination, off-site migration of significant concentrations of TCE vapors via these utility corridors is unlikely for several reasons.

    - First, a soil vapor extraction (SVE) system was operated for several decades in this area and has remediated soil TCE vapor concentrations to the extent practicable.

    - Second, as noted above, the utilities which network off-site consist of natural gas, electric, and communications rather than sanitary or storm sewer. As such, these utility lines themselves are unlikely to act as vapor conduits because they are either solid (i.e., unable to transport fluids) or under constant positive pressure (i.e., unlikely to allow intrusion).

    - Third, as explained in Section 2.A.i. and ii. of the updated closure packet submitted to the WDNR on July 28, 2020, the top 11 feet of the soil column in the immediate vicinity of the manufacturing plant consists of sand and gravel fill used for construction purposes, and the remainder of the site is underlain by pitted glacial outwash deposits that are classified as primarily sands with lesser amounts of silty sands, sandy silts, sand-clay mixtures, clay, and silty gravels. Boring logs documenting these soils have been submitted to the WDNR in previous reports. Given the relatively high porosity of the sand/gravel fill and native sandy soils underlying the slab and relatively low concentrations of TCE in sub-slab vapor, it is highly unlikely that these conditions would result in TCE concentrations exceeding a VAL in indoor air, even if a utility corridor is present. Existing TCE concentrations in sub-slab vapor only intermittently exceed the residential VRSL and are well below the applicable industrial VRSL, the exceedance of which would necessitate indoor air sampling. The residential VRSL are inapplicable at this facility.

- Additionally, the nearest off-site receptor building is approximately 700 feet from the vapor source area and the already relatively low TCE concentrations in sub-slab soil vapor in the source area are likely to decrease to concentrations below any regulatory significance over this distance.

Evaluation of 1,4-Dioxane Potential

The WDNR Response Letter sought an assessment of 1,4 Dioxane. Ayres completed a comprehensive records review that included researching the history of 1,4-Dioxane production and uses, review of the facility's historical Material Safety Data Sheets (MSDS), abandonment documentation for the dry well and septic tank, historical groundwater analytical results, and a review of REMChlor diffusion model results for 1,1,1 trichloroethane (TCA) and TCE in the groundwater at the site.

History of 1,4-Dioxane Production, Uses, Fate, and Transport in Groundwater

U.S. commercial manufacturing of 1,4-Dioxane began at a small scale in 1929 with production increasing in 1951 and then spiking in the early 1970s. Because of its broad range of solvent properties, 1,4-Dioxane has been utilized in a variety of applications[1]. In the past, 1,4-dioxane was used primarily as a stabilizer in chlorinated solvents, particularly for TCA. Approximately 90% of former production of 1,4-Dioxane was used in this application for TCA. As such, TCA is the most likely source of the compound. 1,4-Dioxane was typically used as a stabilizer at a concentration of 1 to 3.5% by volume in chlorinated solvents.

The fate and transport of 1,4-Dioxane in the environment is controlled by the compound's physical and chemical properties, media transport characteristics, and the favorability of conditions for biodegradation. Infiltration of 1,4-Dioxane through soil and into groundwater occurs with minimal retardation because of its miscibility in water and low potential for adsorption to organic carbon (low partitioning coefficient). Chemical characteristics of 1,4-Dioxane suggest significantly greater mobility than chlorinated solvents and studies show that 1,4-Dioxane plumes can extend well beyond the organic co-contaminants released at the same time and locations (Adamson et al. 2015; Mohr et al. 2010).

Potential for Introduction of 1,4-Dioxane into Groundwater at the Nor-Lake Site

Plant construction on the 40-acre site took place in several phases in 1960, 1962, 1965, 1972, and 1980. During the 1960's through approximately 1972 (at the latest), wash water from the finishing operation was solvent-based and contained primarily TCA and TCE. Wash water was discharged to the septic system, which resulted in a release of solvent-based wash into groundwater on site. Nor-Lake started utilizing a non-solvent-based wash between 1968-1972 and has continued this practice through present-day operations. As such, solvent-based wash has not been utilized as a source at the site for approximately 50 years.

Based on a review of the historical documents mentioned above, although the use of 1,4 Dioxane cannot be confirmed, Nor-Lake also cannot eliminate the possibility that the TCA-based chlorinated solvents used in the 1960's may have contained 1,4-Dioxane. On June 21, 1984, sludge samples were collected from the dry well and septic tank prior to abandonment. Results indicated the sludge had a concentration

[1] According to the Department's Drinking Water Program "White Paper-Rule Development" for the Cycle 10 rulemaking, this compound can also be found in laboratory chemicals, cosmetics, detergents, shampoos and is a by-product of the manufacture of common plastics. As such, it is expected to be ubiquitous in the environment.

of 58.4% TCA and a concentration of up to 22.2% TCE. There is a worst-case potential that up to 3.5% by volume of these sludge samples contained 1,4-Dioxane.

However, results from the most recent groundwater sampling event conducted in June of 2019 indicate very low concentrations of TCE and TCA persisting in the Nor-Lake plume of concern. TCE was detected in five on-site monitoring wells (MWs 3,4,16,18 and 19) with detectible concentrations ranging from 0.48-11.1ppb, and in twelve off-site monitoring wells (MWs 5S,5D,7,9,10S,13,51,52,53,54,55 and 57D) with detectible concentrations ranging from 0.29-2.2 ppb. TCA, however, (the vastly predominant likely source of 1,4-Dioxane) was only detected in two monitoring wells. TCA was detected in one on-site monitoring well (MW-19) at a concentration of 1.4ppb, and one off-site monitoring well (MW-10S) at a concentration of 0.27ppb.

Through evaluating these most recent results, as well as the solubility, specific gravity, vapor pressure and Henry's Law constants, octanol-water partition coefficient (K_{OW}), and organic carbon portioning coefficient (K_{OC}) for 1,4-Dioxane, TCE and TCA and the length of time (five decades) since TCA use, it is our professional opinion that if Nor-Lake had historically introduced 1,4 Dioxane into the groundwater on site, it is unlikely that 1,4-Dioxane would currently be present at detectable concentrations both on and off the site. If 1,4-Dioxane were present in groundwater during the time Nor-Lake historically used chlorinated solvents in the wash water, it would have already moved downgradient from the present Nor-Lake plume of concern due to its greater mobility in groundwater and would be diluted to undetectable concentrations due to dispersion as previously discussed above.

In summary, to address the concerns in the September 29, 2020, WDNR Response Letter and the approved Work Plan submitted to the DNR on November 24, 2020, this review of the potential for the introduction of 1,4 Dioxane indicates that sampling for 1,4 Dioxane is not needed. Although a review of historic files indicates that Nor-Lake cannot eliminate the possibility that 1,4 Dioxane may have been introduced onsite through the use of wash water containing chlorinated solvents, such as TCA, the review has also not produced direct evidence that Nor-Lake has introduced 1,4-Dioxane into the groundwater on site. In addition, as described above, if 1,4-Dioxane were once present in the groundwater on-site due to introduction from the site, it is likely that it is no longer present at detectible concentrations due to its mobility and dispersion over time and area and the relative concentrations of TCA remaining. Lastly, if 1,4-Dioxane were to be detected at low concentrations on-site, the source of the contamination would not be certain due to the historically discussed co-mingled nature of the plume as there are other known sources of chlorinated solvents in the groundwater within this region.

Routine Maintenance Activities on Residential Carbon Filter Units

Ayres has provided Culligan Water in Stillwater, Minnesota a list of 17 carbon filter systems that were due to be changed out in 2020 in the residential and commercial neighborhood. Culligan Water will contact Ayres once these filter systems have been changed out and Ayres will then attempt to contact each residence or commercial property to schedule an appointment to conduct confirmatory sampling of VOCs on their treated water supply.

References

Adamson, David T; Anderson, R. Hunter; Mahendra, Shaily; Newell, Charles J. (2015). Evidence of 1,4-Dioxane Attenuation at Groundwater Sites Contaminated with Chlorinated Solvents and 1,4-Dioxane. *Environmental Science & Technology* 49(11):6510-6518.

Mohr, Thomas K.G., Stickney, J.A.; DiGuiseppi, W.H. (2010). Environmental Investigation and Remediation: 1,4-Dioxane and Other Solvent Stabilizers. Boca Raton, FL: CRC Press.

Appendix A

Tables

A.4.a. - Vapor Analytical Results Table
Sub-Slab
Nor-Lake, 891 County Road U, Hudson, WI

Sample ID			VS-1				VS-2				VS-3				VS-4			
Date			5/15/19	6/13/19	7/2/19	11/21/19	5/15/19	6/13/19	7/2/19	11/21/19	5/15/19	6/13/19	7/2/19	11/21/19	5/15/19	6/13/19	7/2/19	11/21/19
Sample start time			1512	1307	1158	1105	1536	1305	1148	1116	1551	1246	1119	1135	1607	1232	1128	1155
Sample end time			1518	1314	1207	1114	1544	1312	1156	1126	1559	1258	1126	1145	1614	1240	1138	1206
		Sub-Slab VRSLs (CR=10^-5; HI=1)																
Parameter	**CAS**	**Large Commercial / Industrial (AF=0.01)**																
1,1,1-Trichloroethane	71-55-6	2,200,000	248	415	1,060	6.2	632	78.5	2,140	72.3	57.0	260	72.1	3.9	149	30.1	456	0.87 J
1,1,2-Trichloroethane	79-00-5	88	<0.50	<0.98	<2.0	<1.3	<0.47	<0.98	<2.0	<0.47	<0.45	<0.98	<2.0	<0.45	<0.46	<0.93	<2.2	<0.45
1,1-Dichloroethane	75-34-3	7,700	<0.45	<1.5	<1.5	<1.2	<0.42	<1.5	<1.5	<0.44	<0.40	2.5	<1.5	<0.42	1.8	<1.4	4.2	<0.42
1,1-Dichloroethene	75-35-4	88,000	<0.55	<1.4	<1.5	<1.5	<0.51	<1.4	<1.5	<0.53	2.0	<1.4	6.2	<0.51	<0.50	3.7	<1.6	<0.51
1,2-Dichloroethane	107-06-2	470	1.8	<0.73	<0.74	<0.82	1.1	<0.73	<0.74	<0.29	<0.27	<0.73	<0.75	<0.28	<0.27	<0.69	<0.80	<0.28
Chloroethane	75-00-3	4,400,000	<0.53	<0.95	<2.4	<1.4	<0.49	<0.95	<2.4	<0.50	<0.47	<0.95	<2.5	<0.49	<0.48	<0.90	<2.6	<0.49
Dichlorodifluoromethane	75-71-8	44,000	2.6	3.6	3.7	2.4 J	2.2	2.8	3.7	1.8	2.0	3.8	4.0	<0.55	2.6	3.5	4.4	<0.55
Tetrachloroethene	127-18-4	18,000	19.9	69.7	126	8.0	32.5	4.0	118	118	17.8	83.4	21.5	307	38.0	12.3	175	345
Trichloroethene	79-01-6	880	68.3	161	257	<1.4	71.3	7.2	198	1.2	22.7	249	38.3	<0.47	129	18.5	424	<0.47
Trichlorofluoromethane	75-69-4	No Inhal. Tox. Info	2.4	3.2	3.9	3.1 J	2.9	4.2	4.0	3.8	2.2	2.4	3.4	3.9	2.1	2.8	2.9	3.7
Vinyl chloride	75-01-4	2,800	<0.25	<0.46	<0.47	<0.69	<0.24	<0.46	<0.47	<0.24	<0.23	<0.46	<0.48	<0.24	<0.23	<0.44	<0.50	<0.24
cis-1,2-Dichloroethene	156-59-2	No Inhal. Tox. Info	<0.44	<1.4	<1.5	<1.2	<0.41	<1.4	<1.5	<0.42	<0.39	5.4	<1.5	<0.41	3.5	<1.4	8.2	<0.41
trans-1,2-Dichloroethene	156-60-5	18,000	0.99 J	1.5	3.2	<1.6	1.8	<1.4	2.5	<0.55	<0.51	2.3	<1.5	<0.53	1.6	<1.4	3.9	<0.53

Notes:
VRSL - vapor risk screening level based on EPA Regional Screening Level Calculator, December 2020
All units in ug/m3 = micrograms per cubic meter
J = estimated analyte concentration between limit of detection and limit of quantitation
CR = cancer risk; HI = hazard index; AF = attenuation factor
Analysis by method TO-15
Leak detection via water dam and shut-in tests - All samples passed leak detection tests prior to sample collection.
Collection via 1-L Summa canisters with 200 mL per minute flow control
Communication Testing - NA - no sub-slab depressurization system installed on site.

A.4.a. - Vapor Analytical Results Table
Sub-Slab
Nor-Lake, 891 County Road U, Hudson, WI

Sample ID			VS-5				VS-6				VS-7			
Date			5/15/19	6/13/19	7/2/19	11/21/19	5/15/19	6/13/19	7/2/19	11/21/19	5/15/19	6/13/19	7/2/19	11/21/19
Sample start time			1623	1225	1101	1215	1636	1215	1052	1240	1653	1149	1044	1304
Sample end time			1630	1233	1108	1227	1644	1222	1059	1256	1700	1156	1051	1315
		Sub-Slab VRSLs (CR=10^-5; HI=1)												
Parameter	**CAS**	**Large Commercial / Industrial (AF=0.01)**												
1,1,1-Trichloroethane	71-55-6	2,200,000	42.9	74.9	128	<0.56	16.6	6.1	16.7	90.9	69.4	131	292	<0.53
1,1,2-Trichloroethane	79-00-5	88	<0.46	<0.95	<2.1	<0.44	<0.46	<0.98	<2.0	<0.42	<0.46	<0.98	<2.1	<0.41
1,1-Dichloroethane	75-34-3	7,700	<0.41	<1.4	<1.5	<0.40	<0.41	<1.5	<1.5	<0.39	<0.41	<1.5	<1.5	<0.38
1,1-Dichloroethene	75-35-4	88,000	1.1 J	2.2	3.1	<0.49	1.0 J	1.6	1.9	1.1 J	1.2 J	<1.4	1.8	<0.47
1,2-Dichloroethane	107-06-2	470	<0.27	<0.70	<0.77	<0.27	<0.27	<0.73	<0.75	<0.26	<0.27	<0.73	<0.77	<0.26
Chloroethane	75-00-3	4,400,000	<0.48	<0.92	<2.5	<0.47	<0.48	<0.95	<2.5	<0.45	<0.48	<0.95	<2.5	<0.44
Dichlorodifluoromethane	75-71-8	44,000	1.9	3.4	3.7	1.1 J	2.7	5.8	7.2	8.5	1.7 J	2.6	2.8	0.87 J
Tetrachloroethene	127-18-4	18,000	23.4	24.3	39.3	769	21.7	20.2	27.5	75	19.1	30.5	63.8	842
Trichloroethene	79-01-6	880	34.0	35.8	61.0	<0.46	15.8	7.8	13.8	25.1	53.6	90.6	160	<0.43
Trichlorofluoromethane	75-69-4	No Inhal. Tox. Info	2.6	3.5	4.1	4.7	2.9	3.5	4.0	8.6	4.4	5.3	7.5	4.4
Vinyl chloride	75-01-4	2,800	<0.23	<0.44	<0.49	<0.23	<0.23	<0.46	<0.48	<0.22	<0.23	<0.46	<0.49	<0.22
cis-1,2-Dichloroethene	156-59-2	No Inhal. Tox. Info	<0.40	<1.4	<1.5	<0.39	<0.40	<1.4	<1.5	<0.38	<0.40	<1.4	<1.5	<0.37
trans-1,2-Dichloroethene	156-60-5	18,000	<0.52	<1.4	<1.5	0.77 J	<0.52	<1.4	<1.5	1.2 J	0.57 J	<1.4	2.0	3.6

Notes:
VRSL - vapor risk screening level based on EPA Regional Screening Level Calculator, December 2020
All units in ug/m3 = micrograms per cubic meter
J = estimated analyte concentration between limit of detection and limit of quantitation
CR = cancer risk; HI = hazard index; AF = attenuation factor
Analysis by method TO-15
Leak detection via water dam and shut-in tests - All samples passed leak detection tests prior to sample collection.
Collection via 1-L Summa canisters with 200 mL per minute flow control
Communication Testing - NA - no sub-slab depressurization system installed on site.

A.4.a. - Vapor Analytical Results Table
Sub-Slab
Nor-Lake, 891 County Road U, Hudson, WI

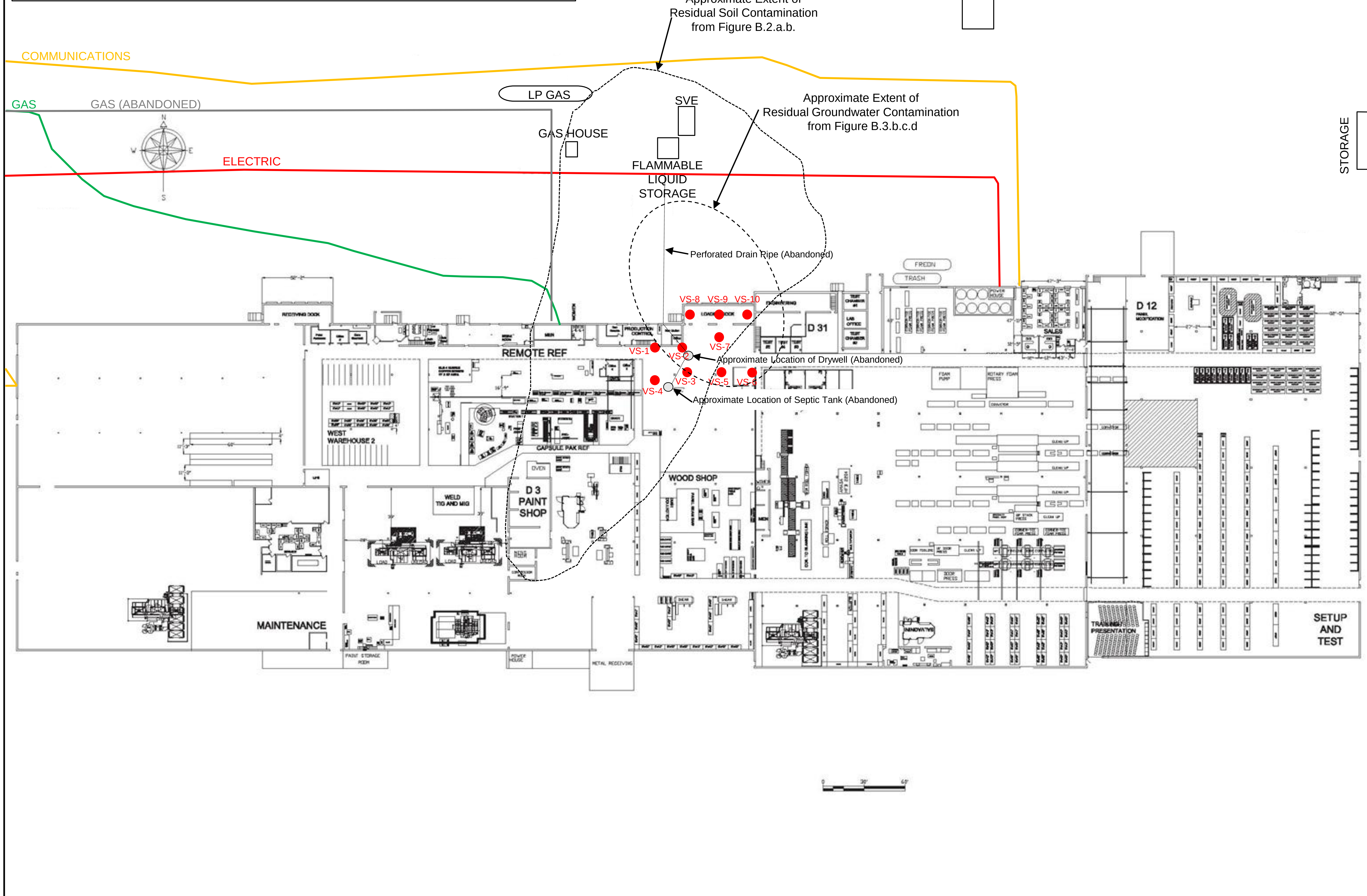
Sample ID			**VS-8**				**VS-9**				**VS-10**			
Date			5/15/19	6/13/19	7/2/19	11/21/19	5/15/19	6/13/19	7/2/19	11/21/19	5/15/19	6/13/19	7/2/19	11/21/19
Sample start time			1707	1128	1016	1320	1733	1114	1005	1340	1752	1102	956	1400
Sample end time			1716	1135	1023	1331	1742	1121	1012	1348	1759	1109	1003	1404
		Sub-Slab VRSLs (CR=10^-5; HI=1)												
Parameter	**CAS**	**Large Commercial / Industrial (AF=0.01)**												
1,1,1-Trichloroethane	71-55-6	2,200,000	9.5	<2.0	<2.0	<0.52	5.2	<2.0	3.9	<0.52	2.8	<1.9	2.9	<0.58
1,1,2-Trichloroethane	79-00-5	88	<0.47	<0.98	<2.0	<0.41	<0.43	<0.98	<2.1	<0.41	<0.46	<0.97	<2.0	<0.45
1,1-Dichloroethane	75-34-3	7,700	<0.42	<1.5	<1.5	<0.38	<0.38	<1.5	<1.5	<0.38	<0.41	<1.4	<1.5	<0.42
1,1-Dichloroethene	75-35-4	88,000	<0.51	<1.4	<1.5	<0.46	<0.47	<1.4	<1.5	<0.46	<0.50	<1.4	<1.5	<0.51
1,2-Dichloroethane	107-06-2	470	<0.28	<0.73	<0.75	<0.25	<0.26	<0.73	<0.77	<0.25	<0.27	<0.72	<0.74	<0.28
Chloroethane	75-00-3	4,400,000	<0.49	<0.95	<2.5	<0.44	<0.44	<0.95	<2.5	<0.44	<0.48	<0.93	<2.4	<0.49
Dichlorodifluoromethane	75-71-8	44,000	2.0	2.5	2.4	2.5	2.3	2.7	2.5	2.6	2.1	2.4	2.5	2.7
Tetrachloroethene	127-18-4	18,000	9.8	<1.2	1.8	7.3	6.1	<1.2	9.6	3.2	4.0	<1.2	2.3	1.8
Trichloroethene	79-01-6	880	12.2	<0.97	<1.0	<0.43	5.1	<0.97	1.3	<0.43	2.3	<0.95	1.2	<0.47
Trichlorofluoromethane	75-69-4	No Inhal. Tox. Info	1.7 J	<2.0	2.9	5.0	1.9 J	2.3	5.9	2.4	1.5 J	<2.0	<2.1	2.0 J
Vinyl chloride	75-01-4	2,800	<0.24	<0.46	<0.48	<0.21	<0.22	<0.46	<0.49	<0.21	<0.23	<0.45	<0.47	<0.24
cis-1,2-Dichloroethene	156-59-2	No Inhal. Tox. Info	<0.41	<1.4	<1.5	<0.37	<0.37	<1.4	<1.5	<0.37	<0.40	<1.4	<1.5	<0.41
trans-1,2-Dichloroethene	156-60-5	18,000	<0.53	<1.4	<1.5	<0.48	<0.49	<1.4	<1.5	<0.48	<0.52	<1.4	<1.5	<0.53

Notes:
VRSL - vapor risk screening level based on EPA Regional Screening Level Calculator, December 2020
All units in ug/m3 = micrograms per cubic meter
J = estimated analyte concentration between limit of detection and limit of quantitation
CR = cancer risk; HI = hazard index; AF = attenuation factor
Analysis by method TO-15
Leak detection via water dam and shut-in tests - All samples passed leak detection tests prior to sample collection.
Collection via 1-L Summa canisters with 200 mL per minute flow control
Communication Testing - NA - no sub-slab depressurization system installed on site.

Appendix B

Figures

NOTES:
- Only utilities corridors which lead off-site are depicted in addition to historical septic system features.
- No Industrial VRSLs were exceeded on site for any VOCs analyzed.



Source: Modified from Nor Lake 2020 and Ayres Associates 2019

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51-0478.00

B.4.a. Vapor Intrusion Map
Nor Lake Inc.
Hudson, WI
Revised January 2021