INTERIM ACTION DOCUMENTATION REPORT & OPERATION, MAINTENANCE & MONITORING PLAN

November 5, 2021

Jagemann Plating Company
1324 S. 26th Street
Manitowoc, WI 54224 **WDNR**
BRRTS# 02-36-555544

Submitted To:

Wisconsin Department of Natural Resources
Tauren Beggs
WDNR Green Bay Service Center
2984 Shawano Ave
Green Bay, WI 54313-6727

Prepared By:

EnviroForensics, LLC
N16 W23390 Stone Ridge Drive, Suite G
Waukesha, WI 53188
Phone: (262) 290-4001

Rob Hoverman, PG
Regional Director

Rob Fedorchak, PE
Senior Engineer & NRPP Certified
Radon Mitigation Professional

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1.0 BACKGROUND

The Wisconsin Department of Natural Resource (WDNR) requested vapor mitigation for the Jagemann Plating Company (Site). The Site is located at 1324 S 26th Street, Manitowoc, WI 54220, and is assigned WDNR BRRTS #02-36-555544. Jagemann Plating Company contracted EnviroForensics to evaluate the existing site systems for effectiveness in mitigating the vapor intrusion risk associated with soil vapor from a release of trichloroethene (TCE) and its associated breakdown products. TCE use at the Site was discontinued in the 1980s. During the investigation activities, the primary consultant, Robert E. Lee & Associates (REL) directed vapor sampling in 2014 in the plating and office areas of the facility as part of the investigation. Radon Abatement of Hales Corners, Wisconsin, designed and installed an initial sub-slab depressurization system (SSDS) during September 2015 in the office basement to address identified exceedances of the Large Commercial/Industrial Indoor Air Vapor Action Level (VAL) for TCE. While there are no detections of TCE above the immediate action vapor intrusion screening levels in the indoor air, the WDNR requested additional vapor intrusion investigation in the plating facility for potential vapor intrusion from sub-slab vapors. Follow-up sampling was conducted in February 2021 to confirm previously observed conditions and effectiveness of the SSDS. **Figure 1** presents the vapor sampling locations on a Site Plan, and **Appendix A** presents the Vapor Analytical Table.

The existing VMS system installation utilizes a sub-slab-depressurization system (SSDS) to mitigate the office's basement. Additional mitigation is supported by the heating, ventilation, and air condition (HVAC) units in the office and breakroom. In the plating and warehouse areas of the Site, the air scrubbers, make-up air units (MAUs), and building ventilation systems, hereafter collectively referred to as the mechanical systems, provide primary mitigation through fresh air circulation. The SSDS, HVAC units, and mechanical systems provide the necessary vapor mitigation and will function as a vapor mitigation system (VMS) for the Site.

Given the Site is already mitigated by existing SSDS, HVAC, and mechanical systems, only operation, maintenance, and monitoring, the WDNR requires that VMS be monitored and maintained to ensure ongoing effectiveness. Proper operation of the VMS system is necessary to prevent exposure to the chemicals of concern via vapor intrusion. The VMS currently functions by depressurizing the sub-slab space in the basement and turning over indoor air with unaffected outdoor air to prevent vapors from affecting indoor air quality. Additional vapor mitigation is provided by the HVAC and mechanical systems in the plant and confirmed by indoor air sampling showing the indoor air was not affected above Vapor Risk Screening Levels at the Site. This report documents the VMS as an Interim Action as defined by WAC NR 724,

how these systems are functioning to protect indoor air, and how their continued operation will be documented.

2.0 CONTACTS

Responsible Party: Jagemann Plating Company
Address: 1324 S. 26th St., Manitowoc, WI 54224
Contact: Mike Jagemann
Telephone: (920) 682-6883

Consultant: Robert E. Lee & Associates, Inc.
Address: 1250 Centennial Centre Boulevard, Hobart WI 54155
Contact: Nicole L. LaPlant Project Manager / Geologist
Telephone: 920-662-9641
Email: nlaplant@releeinc.com

Consultant: EnviroForensics
Address: N16 W23390 Stone Ridge Dr., Suite G, Waukesha, WI 53188
Contact 1: Rob Hoverman, PG, Senior Project Manager
Telephone: 262-290-4001
Email: rhoverman@enviroforensics.com

Contact 2: Robert S. Fedorchak, PE & NRPP Certified Radon Mitigation Professional
Telephone: 317.614.0586
Email: rfedorchak@enviroforensics.com

Contractor: Total Mechanical
Address:W234 N2830 Paul Rd., Pewaukee, WI 53072
Contact: Luke Adrian, CHVAC Controls Project Manager
Phone: 262-522-7156
E-mail: ladrian@total-mechanical.com

WDNR Project Manager: Tauren Beggs, Hydrogeologist
Address: 2984 Shawano Ave
Green Bay, WI 54313-6727
Telephone #: 920-510-3472
Email: Tauren.Beggs@wisconsin.gov

3.0 SYSTEM DESIGN AND CONSTRUCTION

3.1 Sub-slab Depressurization System (SSDS)

Radon Abatement designed the VMS in September 2015 and installed it on October 21, 2015. Design and construction documentation for the VMS is provided in the November 4, 2015, *SSD Vapor Extraction Final Report* prepared by Radon Abatement, included as **Appendix B**.

The final system configuration is depicted on **Figure 2**. The SSDS is constructed with one (1) extraction point connected via 4-inch schedule-40 polyvinyl chloride piping to one (1) RadonAway model RP 265 fan to supply negative pressure to the basement sub-slab environment. Photographs of system components are presented in **Appendix C**.

3.2 HVAC and Mechanical Systems

Additional mitigation is supported by the HVAC and mechanical systems at the Site. The office utilizes three (3) split unit furnaces and air conditioners while one (1) rooftop package unit serves the breakroom. Each of these HVAC systems utilizes fresh air economizers that introduces fresh air and conditions the outdoor air in either the heating or cooling mode.

The plating areas of the Site utilize several mechanical systems that move indoor air out and fresh air into the facility. The primary mechanical systems that remove air from the building are the "scrubbers." Without the continuous operation of the mechanical systems, the plating areas are not suitable for occupation, and therefore, are considered permanent features that prevent exposure to TCE and associated breakdown products. Air scrubbers, exhaust fans, and make up air units operate continuously to control steam/mist, particulates, and odors to maintain the interior environment for Site workers and a requirement of the Site air permit. Two air scrubbers, seven exhaust fans, and four (4) MAUs, and several non-mechanical vents serve to maintain conditions within the Site plating and warehouse areas. Detailed discussion regarding the HVAC and mechanical systems is provided in **Section 4.0.**

4.0 SYSTEM OPERATION, MAINTENANCE, AND MONITORING

Operation, maintenance, and monitoring (OM&M) of the VMS at the Site is required until remediation is sufficient that its operation is no longer needed. These sections document the functionality of the VMS for the Site and processes by which their operation will be documented. On September 23, 2021, EnviroForensics and Total Mechanical evaluated the Site structures and mechanical systems to understand potential vapor migration. Based on that evaluation, EnviroForensics determined that office and breakroom functioned as a single building space due to the HVAC configuration and the plating and warehouse areas function together as a second building due to the configuration of air scrubbers, secondary ventilation, and MAUs.

4.1 Office and Breakroom - HVAC and SSDS Operation

Office SSDS

One (1) RadonAway RP-265 is hardwired to a dedicated circuit breaker in the electrical panel on the south wall of the Office building. Operation of the VMS can be confirmed by inspecting the fan or checking the u-tube manometer that is installed in system extraction pipe (refer to photographs of the u-tube manometers in **Appendix B**). The system is designed and intended to operate continuously. Data collected during the design indicated there was sufficient vacuum to achieve effective slab depressurization.

Office and Breakroom HVAC Operation

The office utilizes three (3) split unit furnaces and air conditioners while one (1) rooftop package unit serves the breakroom. Because these HVAC systems are required to maintain environmental comfort and will remain regardless of the need for VMS considered permanent, detailed review of components was assessed, rather the performance in the building. The units were measured for operational parameters and pressure differences between the plant. The measured air flow and operation parameters for these areas were as follows:

Area Served		Volume (cfm)	HVAC Summary	
East Office	Supply	509	Total Outdoor Air Input (cfm)	1,116
	Return	506		
	Outdoor Air Input	20	Total Outdoor Air Input Potential/day (cfm)	1,607,040
Basement	Supply	702		
	Return	NA	Total Served Area (ft^2)	7,000
	Outdoor Air Input.	75		
West Office	Supply	1131	Total Building Volume (ft^3)	56,000
	Return	744		
	Outdoor Air Input	387	Maximum IA Change Overs/Day	29
Breakroom	Supply	1084		
	Return	450	Estimated Minimum Change Overs/Day	4
	Outdoor Air Input	634		

cfm = cubic feet per minute

Any HVAC systems must be essentially balanced, which means any supply air must equal the sum of return air and outdoor input. There in an inherent degree of error as it will not perfectly balance due various losses in the system ductwork and occasional fresh air from the opening of doorways. In the office and cafeteria area of the building fresh air is brought into the building each time the furnace or air conditioner cycles. In the coldest and hottest months this will mean the system is operating nearly continuous turning over the indoor air with outdoor upwards of 29 times per day or approximately 10 times during normal business hours (8am to 5pm). This provides significant vapor intrusion abatement in these areas. The office and breakroom operate negative to the plating areas and have fresh air economizers that likely minimize the accumulation of vapor from the subsurface. In the office and breakroom, the SSDS would be considered the primary mitigation. Because the moderate temperatures in the spring and fall shoulder seasons decrease the operational rates of HVAC systems, the fans will be set to run continuous from May 1 to June 15 in the spring and from August 15 to September 30 during the fall. Running the fans continuously allows the systems to bring in fresh air regardless of thermostat calling for heating or cooling. This maximizes the amount of fresh air change over with minimal increase to the operational costs.

4.2 Plating and Warehouse Mechanical System

Without the continuous operation of the mechanical systems, the plating areas are not suitable for occupation, and therefore, are considered permanent features that prevent exposure to TCE and associated breakdown products. Air scrubbers, exhaust fans, and make up air units operate continuously to control steam/mist, particulates, and odors to maintain the interior

environment for Site workers and a requirement of the Site air permit. The measured air flow and operation parameters for these areas were as follows:

Exhaust	Volume (cfm)
Scrubber #1	17,000
Scrubber #2	20,000
Exhaust Unit #3	26,000
Exhaust Unit #4	3,700
Exhaust Unit #5	1,200
Exhaust Unit #6	6,000
Exhaust Unit #7	24,000
Exhaust Unit #8	6,300
Exhaust Unit #9	40,500
EXHAUST TOTAL BLDG	***144,700***
Fresh Air Input	**Volume (cfm)**
Warehouse East MAU	4,200
Warehouse West MAU	4,200
Warehouse MAU #1	49,000
Plant MAU #1	58,000
Ventilated Outdoor Air Input TOTAL	115,400
Non Mechanical Outdoor Air Input	29,300
TOTAL PLANT INPUT	***144,700***
Total Served Area (ft^2)	100,000
Total Building Volume (ft^3)	2,000,000
IA Change Overs/Day	14

4.3 System Monitoring

The Wisconsin Department of Natural Resources (WDNR) has issued general guidance for VMS system commissioning and long-term monitoring programs (see August 2018 RR-800; *Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin* https://dnr.wi.gov/files/PDF/pubs/rr/RR800.pdf). The recommendations have been adopted and incorporated into this OM&M Plan.

4.3.1 System Commissioning

Commissioning is intended to demonstrate that the VMS is effectively mitigating vapor intrusion in all conditions. While the recommended events were not performed seasonally during the first year of operation, the 2021 vapor monitoring shows indoor air is effectively mitigated. The following will be implemented during the next sampling event to confirm conditions during the installation.

Office OMM Activities

1. Annually, measure sub-slab pressure field extension (PFE) of the SSDS. The PFE is measured by connecting a hand-held digital manometer to sub-slab test ports installed in the basement floor, designated TP-1, TP-2, and TP-3 (to be installed prior to December 2021 confirmation sampling event);

2. Confirm vacuum induced by each extraction point by measuring with a manometer and measured air flow at each extraction point;

3. Visually inspect the visible floor penetration seals, integrity of slab, sump, all system components including fans, manometers, pressure switches, and piping connections; and

4. Confirm continuous HVAC fan operation during should seasons.

Plating and Warehouse OMM Activities

Because many of the ventilation units are not readily accessible on a day to basis, and their lack of operation would immediately affect the plant environment, monthly confirmation of the operation of MAUs, Scrubbers, and Exhaust Units will be performed. However, any changes in operation, repairs, or down periods for the additional mechanical systems will be tracked with the primary systems noted above.

The checklists for the system operations and maintenance of the SSDS and mechanical systems are provided in **Appendix D**.

4.3.2 Long-Term Monitoring

Long-term monitoring of the VMS begins after commissioning data and observations confirm system effectiveness. Generally, indoor air sampling is not required during long-term monitoring. However, given the nature of the VMS for the Site, an initial confirmation sampling program and longer-term monitoring is proposed in the following table. SSDS monitoring and inspections procedures are required to be conducted annually during the winter months. The HVAC mechanical systems for the office will be inspected by the owner's mechanical contractor to ensure the fan settings remain in "on" position and the fresh air economizers are set to open. The mechanical systems of the plant portions of Site will effectively be inspected daily due the plating operations requiring its continued operation and recorded monthly. Post-

commissioning inspection procedures are presented in **Section 4.4** below. The follow presents the vapor sampling plan to ensure building occupants are adequately protect from sub-surface vapors. The plan is devised to evaluate both short term and long-term exposure potentials.

Office: December 2021				
Sample IDs	Summa 8-hr IA	Passive 8-hr IA	Passive 5-day IA	Summa - Grab
IA-4	1	1	1	--
IA-5	1	1	1	--
IA-6	1	1	1	--
IA-9	1	1	1	--
SSDS Effluent	--	--	--	1

Plant: December 2021				
Sample IDs	Summa 8-Hour IA	Paired Summa SSV	Passive 8-hour IA	Passive 5-day IA
IA-1	1	1	1	1
IA-2	1	1	1	1
IA-3	1	1	1	1
IA-7	1	1	1	1
IA-8	1	1	1	1
IA-10	1	1	1	1
IA-11	1	1	1	1
IA-12	1	--	1	1

Plant: February – Supplemental Sampling			
Sample IDs	Summa 8-Hour IA	Passive 8-hour IA	Passive 5-day IA
IA-1	--	--	--
IA-2	--	--	--
IA-3	--	--	--
IA-7	--	--	--
IA-8	--	--	--
IA-10	1	1	1
IA-11	1	1	1
IA-12	1	1	1

Upon completion of these initial monitoring events, the need for on-going monitoring will be evaluated and coordinated with the WDNR.

Indoor Air Sampling Procedures

Each indoor air sample will be from the breathable space (3-5 feet above the floor) at locations shown on **Figure 1**. The samples will be collected using 6-Liter Summa canisters, regulated to withdraw a time-integrated sample or using passive Beacon Chlorosorber™ sampling media. Initial and final pressure readings will be collected from the vacuum canisters and recorded on the Indoor Air Field Sampling Form along with all other required information. The vacuum canisters will be individually-certified by Pace Analytical (Pace) in Minneapolis, Minnesota for QA/QC purposes. Chlorosorber™ passive are single use media and do not required certification in a similar manner. Outdoor air samples will not be collected because there is not a potential for a background source to affect the samples inside the Site.

All indoor air cannisters will be sent to Pace under appropriate chain of custody documents to be analyzed for the chlorinated volatile organic compounds (CVOCs) listed in the Vapor Analytical Table in **Appendix A** by US EPA Method TO-17. Passive indoor air samples will be sent to Beacon under appropriate chain of custody documents to be analyzed for CVOCs according to US EPA Method TO-17.

Sub-Slab Vapor Sampling Procedures

Vapor Pin® sampling ports will be installed for the purpose of collecting sub-slab vapor samples at locations in the plant not previously sampled.

Sub-Slab Vapor Port Installation

A 5/8-inch hole will be drilled through the concrete slab at each sub-slab sample location using an electric hammer drill. The hole will be oversized to 1.25 inches to a depth of approximately one-half inch. The 1.25-inch hole is the correct size for accepting a small flush-mount cover that will complete the permanent installation. A vacuum cleaner will be utilized during drilling to remove concrete dust produced by the process. Vapor Pin® sampling ports, constructed with a silicon sleeve to provide a mechanical seal between the sample port and the slab, will be installed using a dead blow hammer.

Sub-Slab Field Quality Control Methods

Sub-slab vapor ports will be purged prior to connecting the sampling canister to ensure that the entire sample is representative of sub-slab vapor conditions. To ensure that the collected sub-slab vapor samples are representative of subsurface vapor conditions, leak testing will be

performed at each sample port during purging. Leak testing will be performed using the water dam method.

Immediately prior to sample collection, the integrity of the sample tubing and fittings will be tested by conducting a negative pressure test. The sample canister will be connected to the sampling port with its valve closed. A negative pressure of approximately 10-15 inches of mercury will be induced on the sampling train with a hand pump and held for approximately 60-seconds while the gauge is monitored visually. Drops in pressure during this procedure will indicate leakage within the sampling trains that will require correcting and then re-testing. The results of leak testing and pressure testing will be recorded on field sampling logs.

Sub-Slab Vapor Sampling

The sub-slab vapor samples will be collected through dedicated polyethylene tubing connected to the sampling port. In accordance with the U.S. Environmental Protection Agency (EPA) Standard Operating Procedure (SOP), approximately two (2) liters of ambient air will be purged from the tubing prior to initiating sample collection. Following purging, sub-slab vapors at each point will be drawn from the end of the tubing using a low-level photo-ionization detector instrument and the readings will be recorded on the sample forms and laboratory canister labels. Sub-slab vapor will then be drawn into a 6-liter vacuum sample canister fitted with laboratory supplied regulators that allow a flow rate of approximately 200 ml/min.

Sub-slab vapor samples collected during each of the sampling events will be submitted, under appropriate chain-of-custody procedures, to Pace for analysis of CVOCs listed in Vapor Analytical Table in **Appendix A** according to US EPA Method TO-15. The sampling ports will be left in place for future sampling and abandoned at a later date.

Results Reporting

Upon our receipt of the analytical laboratory results, EnviroForensics will provide sample results reports to the property owner, Site occupants, and Wisconsin Department of Natural Resources within 10 days. The reports will include copies of the laboratory analytical reports, and tables summarizing the soil sampling results, indoor air results, and sub-slab vapor results with comparisons to their applicable Residual Contaminant Levels (RCLs), Vapor Action Levels (VALs), and Vapor Risk Screening Levels (VRSLs), respectively. All results will be highlighted, where concentrations exceed standards. Figures will be prepared having the locations of all past and

current data collection points along with associated CVOC analytical results for the soil samples and air/vapor samples, respectively.

4.4 System Maintenance and Repairs

The SSDS fan is factory sealed and require no maintenance. If a fan stops operating due to mechanical failure, the fan shall be replaced with an identical model or a fan with the same performance specifications. Replacement of fans should be handled by a mitigation contractor and/or an electrician. Maintenance and repair activities on other components, including piping and floor seals, can be performed by the environmental consultant, or building maintenance personnel. If MAUs or plating scrubber fail or go down for maintenance, work will be discontinued in the affected area until the unit in question is returned to service.

4.5 Inspection and Repair Logs

Inspection and repair logs for the Mechanical Systems the SSDS shall be completed by the person or group responsible for OM&M of the VMS. The completed inspection logs shall include the findings of the visual inspection. The logs shall be kept on file by the environmental consultant and/or the property owner and submitted to the WDNR on a quarterly basis or in conjunction with sampling data. Blank logs with the required and recommended inspection data are provided in **Appendix D**.

4.6 Sampling Plan

The WDNR shall be notified at least 45 days prior to actions that may alter the system effectiveness or before any actions are taken which would terminate or interrupt operation of the VMS for more than one week.

4.7 Notifications

The WDNR shall be notified at least 45 days prior to actions that may alter the system effectiveness or before any actions are taken which would terminate or interrupt operation of the VMS for more than one week.

5.0 DECOMMISSIONING AND CONTINUING OBLIGATIONS

The SSDS system will be operated until it is no longer needed to prevent vapor intrusion (Wis. Admin. § Code NR 724.13(1)(c)). A Decommissioning Plan will be prepared, if appropriate. In general, decommissioning will be performed according to the following procedure:

- Re-assess the vapor intrusion pathway in the building.
    - Turn the VMS off
    - Collect paired indoor air and sub-slab vapor samples after 2-4 weeks of shut down
    - Repeat paired vapor sampling after 2-6 months
    - Repeat paired vapor sampling after one (1) year following shut down
    - Re-start the VMS
- Submit Post-Closure Modification to WDNR with fees.
- Decommission the VMS following WDNR approval.

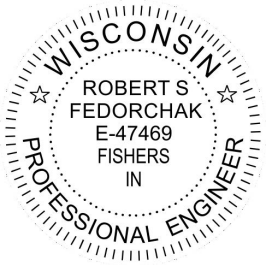
If the VMS system is necessary to mitigate vapor movement into the Site building at the time of case closure, there will be a continuing obligation for any owner of the Site to operate and maintain the VMS system post-closure until such time when the VMS system is no longer necessary. Post-closure OM&M reporting shall be done using the Continuing Obligations Inspection and Maintenance Logs in **Appendix D**.

6.0 CONCLUSIONS

The SSDS, HVAC units, and mechanical systems are providing the necessary vapor mitigation and will function as a vapor mitigation system (VMS) for the Site. No further mitigation or vapor assessment beyond what is presented herein, appear necessary for the vapor risk exposure pathway.

7.0 CERTIFICATIONS

I, Robert S. Fedorchak, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

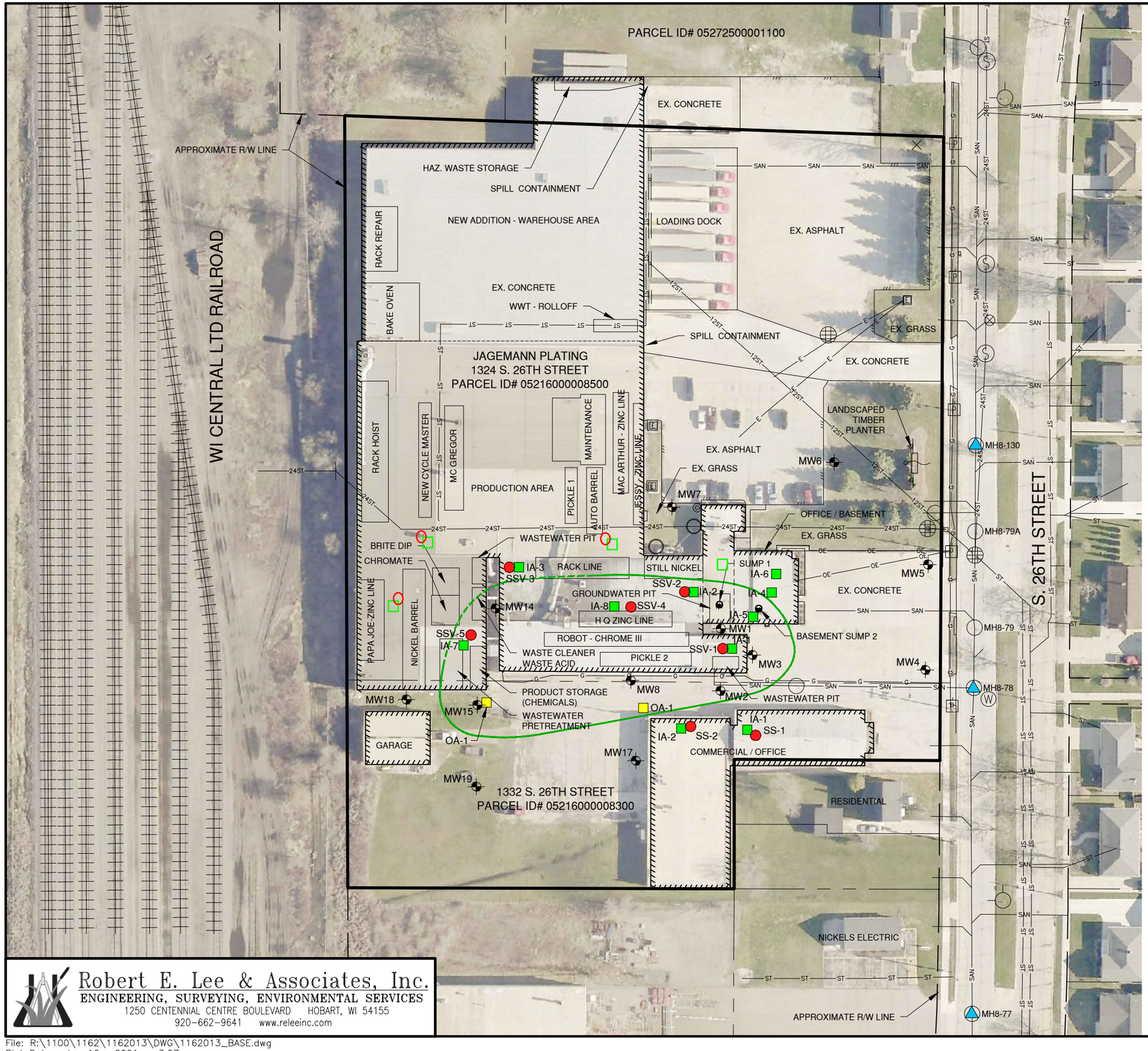


_____Senior Engineer, Lic. No. E-47469
Signature, title and P.E. number

I, Robert Hoverman, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Regional Director 11/5/2021
Signature and title Date

FIGURES



0' 80' 160'

SCALE IN FEET

NORTH

LEGEND

- PROPOSED INDOOR AIR LOCATION4
- PROPOSED SUB-SLAB VAPOR LOCATION
- MW1 — MONITORING WELL LOCATION
- PZ1 — PIEZOMETER LOCATION
- IA-1 — INDOOR AIR SAMPLE LOCATION OUTDOOR
- OA-1 — AIR SAMPLE LOCATION
- SSV-1 — SUB-SLAB VAPOR SAMPLE LOCATION
- MH8-78 — IN-PIPE SANITARY SEWER VAPOR SAMPLE
- SUMP
- EX. SANITARY MANHOLE
- EX. STORM SEWER MANHOLE
- EX. STORM SEWER CATCH BASIN
- EX. FIRE HYDRANT
- EX. WATER VALVE
- EX. WATER MANHOLE
- EX. ELECTRIC PEDESTAL
- EX. POWER POLE
- EX. STORM SEWER
- EX. SANITARY SEWER
- EX. WATERMAIN
- EX. GAS LINE
- EX. ELECTRIC LINE
- EX. TELEPHONE LINE
- EX. FIBER OPTICS LINE
- PROPERTY LINE
- RIGHT OF WAY LINE
- SITE BOUNDARY LINE

ESTIMATED EXTENT OF GROUNDWATER CONTAMINATION IN EXCESS OF ENFORCEMENT STANDARD (DASHED WHERE INFERRED)

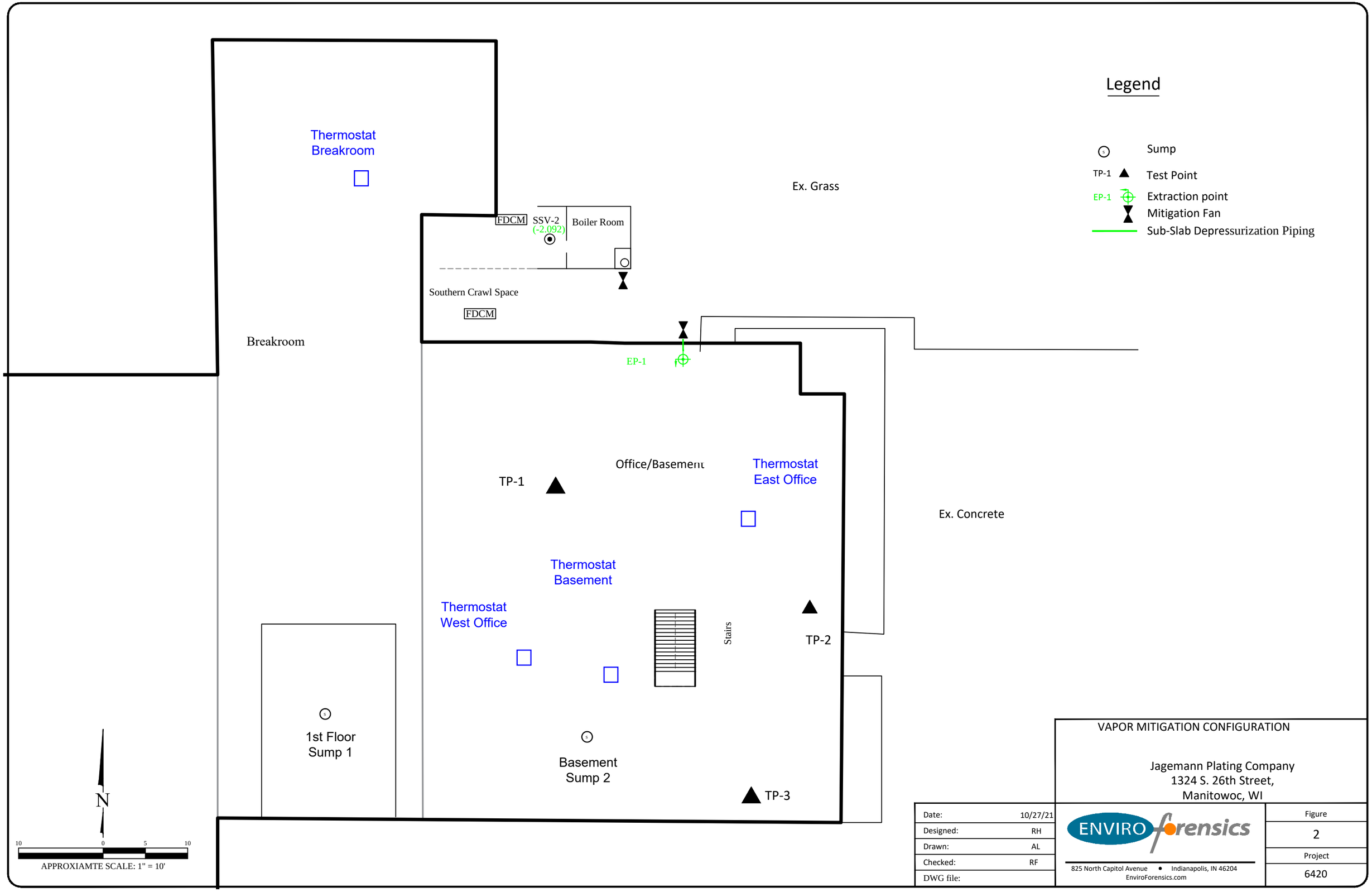
JAGEMANN PLATING COMPANY
1324 S. 26TH STREET
MANITOWOC, WI

SITE PLAN

FIGURE 1

Robert E. Lee & Associates, Inc.
ENGINEERING, SURVEYING, ENVIRONMENTAL SERVICES
1250 CENTENNIAL CENTRE BOULEVARD HOBART, WI 54155
920-662-9641 www.releeinc.com

File: R:\1100\1162\1162013\DWG\1162013_BASE.dwg
Plot Date: Jun 16, 2021 - 3:07pm



VAPOR MITIGATION CONFIGURATION

Jagemann Plating Company
1324 S. 26th Street,
Manitowoc, WI

Date:	10/27/21
Designed:	RH
Drawn:	AL
Checked:	RF
DWG file:	

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Figure
2
Project
6420

APPENDIX A

Vapor Analytical Table

Table A.4.a
Vapor Analytical Table
Jagemann Plating Co., Inc.
1324 S 26th Street, Manitowoc, WI

Address	Sample ID	Sample Location	Exposure Criteria (Land Use)	Sample Type	Date Collected	Mitigation	Relevant VOCs (µg/m^3)				
							1,1-DCE	Cis-1,2 DCE	Trans-1,2 DCE	TCE	Vinyl Chloride
Indoor/Outdoor Air											
Large Commercial/Industrial Sub-Slab Vapor Risk Screening Level (VRSL) -- µg/m^3							88,000	---	18,000	880	2,800
Large Commercial/Industrial Indoor Air Vapor Action Level (VAL) -- µg/m^3							880	---	180	8.8	28
Jagemann Plating Building, 1324 S.26th Street	SSV-1	Former Waste Water Treatment Plant Room	Industrial	Sub-slab vapor	2/9/2014	Pre	26.9	540	57.5	**1,530**	86.7
					3/27/2021	Post-SSDS	9.9 J	1,100	68.3	461	7.2 J
	IA-1			Indoor air	2/9/2014	Pre	ND	ND	ND	0.89	0.39
	SSV-2	East Side Chromium Dip Line Area	Industrial	Sub-slab vapor	2/9/2014	Pre	ND	1,050	67.8	**6,080**	17.8
					3/27/2021	Post-SSDS	14.9 J	965	39.3	**2,920**	4.6 J
	IA-2			Indoor air	2/9/2014	Pre	ND	ND	ND	1.7	ND
	SSV-3	West Side Chromium Dip Line and Pickling Line Area	Industrial	Sub-slab vapor	2/9/2014	Pre	ND	25.3	ND	57.7	21.1
					3/27/2021	Pre	<0.19	8.6	<0.24	8.4	<0.12
	IA-3			Indoor air	2/9/2014	Pre	ND	ND	ND	ND	ND
	SSV-4	Central portion of South Manufacturing Area	Industrial	Sub-slab vapor	3/27/2021	Pre	23,900	3,210,000	**65,400**	**15,300,000**	**8,880**
					5/19/2021	Pre	**94,100**	6,330,000	**162,000**	**31,700,000**	**117,000**
	IA -6/8			Indoor air	5/19/2021	Pre	<0.21	0.56 J	<0.26	3.5	<0.13
	SSV-5	West portion of South Manufacturing Area	Industrial	Sub-slab vapor	3/27/2021	Pre	478	1,290	344	**9,870**	1,070
					5/19/2021	Pre	522	1,060	294	**5,850**	1,450
	IA-7			Indoor air	5/19/2021	Pre	<0.22	0.35 J	<0.27	0.46 J	0.43
	IA-4	First Floor Office Area	Industrial	Indoor air	2/9/2014	Pre	ND	5.2	ND	***9.2***	ND
					3/27/2021	Post-SSDS	<0.20	<0.22	<0.26	0.56 J	<0.13
	IA-5	Basement Storage Area Adjacent to Mechanical Room	Industrial	Indoor air	2/9/2014	Pre	ND	9.0	ND	***14.4***	ND
					3/27/2021	Post-SSDS	<0.19	<0.21	<0.25	<0.32	<0.13
	IA-6	Basement Office Area	Industrial	Indoor air	2/9/2014	Pre	ND	8.3	ND	***13.9***	ND
					3/27/2021	Post-SSDS	<0.19	<0.21	<0.25	<0.32	<0.13
	OA-1	Southwest of Chromium Dip Line Building (upwind)	Industrial	Outdoor air	2/9/2014	Pre	ND	ND	ND	ND	ND

Key:
--- = No screening level established
ND = Not detected above laboratory detection limits
µg/m3 = Micrograms per cubic meter
1,1-DCE = 1,1-Dichloroethene
TCE = Trichloroethene
Cis-1,2 DCE = Cis-1,2 Dichloroethene
Trans-1,2 DCE = Trans-1,2 Dichloroethene
SSDS = Sub-Slab Depressurization System
138 = Vapor Risk Screening Level (VRSL) exceeded
14.5 = Vapor Action Level (VAL) exceeded

Note:
1.) Sub-Slab Depressurization System was installed in the east basement of the on administrative offices are of the Jagemann Plating building on October 21, 2015.

Table A.4.b
Vapor Analytical Table
Jagemann Plating Co., Inc.
1324 S 26th Street, Manitowoc, WI

Address	Sample ID	Sample Location	Exposure Criteria (Land Use)	Sample Type	Date Collected	Relevant VOCs (µg/m^3)					
						1,1-DCE	Cis-1,2 DCE	Trans-1,2 DCE	PCE	TCE	Vinyl Chloride
Indoor/Outdoor Air											
Large Commercial/Industrial Sub-Slab Vapor Risk Screening Level (VRSL) -- µg/m^3						88,000	---	18,000	18,000	880	2,800
Large Commercial/Industrial Indoor Air Vapor Action Level (VAL) -- µg/m^3						880	---	180	180	8.8	28
Commercial Building, 1332 S.26th Street	SS-1	Vacant Office - East Portion of Building	Large Commercial	Sub-slab vapor	8/21/2018	<0.46	<0.37	<0.48	<0.53	<0.43	<0.21
					1/24/2019	<0.50	<0.40	<0.52	<0.57	<0.47	<0.23
	IA-1			Indoor air	8/21/2018	<0.42	<0.34	<0.44	<0.49	<0.40	<0.20
	SS-2	Nelson Sign Cutting Room - West Portion of Building	Large Commercial	Sub-slab vapor	8/21/2018	<0.49	<0.39	<0.51	2.5	2.5	<0.23
					1/24/2019	<0.50	<0.40	<0.52	1.1 J	<0.47	<0.23
	IA-2			Indoor air	8/21/2018	<0.50	<0.40	<0.52	<0.57	<0.47	<0.23
	OA-1	Northwest Coner of Building (upwind)	Large Commercial	Outdoor air	8/21/2018	<0.42	<0.34	<0.44	<0.49	<0.40	<0.20

Key:

--- = No screening level established
ND = Not detected above laboratory detection limits
µg/m3 = Micrograms per cubic meter
1,1-DCE = 1,1-Dichloroethene
PCE = Tetrachloroethene
TCE = Trichloroethene
Cis-1,2 DCE = Cis-1,2 Dichloroethene
Trans-1,2 DCE = Trans-1,2 Dichloroethene
138 = Vapor Risk Screening Level (VRSL) exceeded
14.5 = Vapor Action Level (VAL) exceeded

Table A.4.c
Vapor Analytical Table
Jagemann Plating Co., Inc.
1324 S 26th Street, Manitowoc, WI

Address	Sample ID	Sample Location	Exposure Criteria (Land Use)	Sample Type	Date Collected	Relevant VOCs (µg/m^3)				
						1,1-DCE	Cis-1,2 DCE	Trans-1,2 DCE	TCE	Vinyl Chloride
Sanitary Sewer Pipe Air										
Industrial Land Use - Sanitary Sewer Gas Screening Level (SSGSL) -- µg/m^3						29,333	---	6,000	293	933
Residential Land Use - Sanitary Sewer Gas Screening Level (SSGSL) -- µg/m^3						7,000	---	1,400	70	57
Sanitary Sewer Main, S.26th Street	MH8-130	Upgradient Manhole	Industrial	In-Pipe Air	5/19/2021	<0.19	<0.27	<0.23	<0.27	<0.12
	MH8-78	Jagemann Plating Manhole (source)	Industrial	In-Pipe Air	5/19/2021	0.53 J	5.7	<0.23	4.5	4.3
	MH8-77	Downgradient Manhole	Residential	In-Pipe Air	5/19/2021	<0.20	<0.28	<0.24	<0.28	<0.12

Key:
--- = No screening level established
µg/m3 = Micrograms per cubic meter
1,1-DCE = 1,1-Dichloroethene
TCE = Trichloroethene
Cis-1,2 DCE = Cis-1,2 Dichloroethene
Trans-1,2 DCE = Trans-1,2 Dichloroethene
138 = Industrial Land Use Sanitary Sewer Gas Screening Level (SSGSL) exceeded
14.5 = Residential Land Use Sanitary Sewer Gas Screening Level (SSGSL) exceeded

Notes:
2.) The Sanitary Sewer Gas Screening Level (SSGSL) was calculated by dividing the indoor air VAL for buildings served by the sanitary sewer by a attenuation factor of 0.03 in accordance with WDNR guidance document RR-649.

APPENDIX B

SSD Vapor Extraction Final Report

12221 West Rockne Avenue Hales Corners Wisconsin 53130 414-546-3691
radabt1@wi.rr.com

SSD VAPOR EXTRACTION FINAL REPORT

110415

JAGEMANN PLATING COMPANY
MICHAEL J. JAGEMANN
1324 South 26th Street
Manitowoc, WI 54220
P: 920-682-6883 ext.132
mjagemann@jagemannplating.com

REPRESENTATIVE
Kevin R. Eibenholzl
Senior Environmental Scientist
ROBERT E. LEE & ASSOCIATES, INC
1250 Centennial Centre Boulevard
Hobart, WI 54155
P: 920-662-9641 C: 920-227-7570
keibenholzl@releeinc.com

SITE HISTORY

Evaluations and reports were made available through Kevin Eibenholzl and Michael Jagemann. They were reviewed prior to our evaluation and were beneficial toward the final stages of evaluation, testing and SSD vapor extraction system installation. Our company representatives gained access to the building for the initial evaluation on the 13th of June 2015.

The east basement of the administrative offices of the commercial building was fully accessed for analysis. This is the vapor intrusion area of concern.

After a careful evaluation, assessment, communication testing was completed on 3oth of September 2015.

The pre-SSD diagnostic evaluation findings are attached and marked Attachment "A".

OVERVIEW

The projects objective was to remediate, through sub-slab depressurization vapor extraction, the identified vapors and gases from the subsoil beneath the administrative offices. The entire installation that was conducted on the 21st of October 2015 follows working protocol and standards set by the USEPA and AARST Standards Consortium. Reference the ANSI/AARST RMS-LB2014 GPF. The installed system emphasizes safety, system quality and effectiveness. This SSD vapor extraction remediation incorporates one commercial grade mitigation suction fan. There is one extraction point that accommodates the necessary depressurization needed for vapor extraction.

SSD VAPOR EXTRACTION SYSTEM

1. Sealing was conducted on all floor penetrations and cracks that may have had an effect on the integrity and efficiency of the remediation system. There were several areas that will need to be addressed with sealant and hydraulic cement. This included the sealing of the sump crock in the utility room of the basement at the south exterior wall. A durable custom cut cover was applied to the crock and it was sealed with silicone for easy access of the sump crock and sump pump. There was a screw out 4 ½ inch access port installed in the crock cover for crock and pump monitoring.

2. The drop pit was developed in the educational centre section of the basement adjacent to the central north wall.

   The drop pipe was secured to the drop pit and north basement wall, before it exited to the central north exterior wall.

3. Exterior ventilation piping was interconnected from the said drop point and internal ventilation pipe extract concentrated product with the remediation suction fan.

4. The vapor extraction fan was applied to the north exterior wall.

5. The exterior exhaust pipe was carried vertical twelve inches above the eave of the roof. A goose neck fitting was applied to the top of the exhaust to direct the abated vapors to the north-east for safety.

The fan is very quiet, water hard, durable and has a good longevity record. They are manufactures by Spruce Environmental of Massachusetts. The extraction fans have limited five year warranties and utilize approximately $123.00 of electrical energy per year. The fan is has an 83 watt motor. The fan was sized for the vapor extraction following the final stages of installation. Efficiency, effectiveness as well as the manufacturer's suggested recommendations guided the final remediation fan choice.

An anti-freezing (Fan Guard) appliance was applied above and below the fan for longevity of the fan.

6. A fail safe "U" tube manometer monitor was applied to the system at the main vertical riser of ventilation pipe in the basement. This is for the convenience of the buildings occupants to monitor function and fan failure.

7. An electrical disconnect was attached to the ventilation fan. The owner's State licensed electrician gained electrical power from a code compliant source.

8. The system was tested for efficiency of depressurization on the 4th of November 2015. The results indicate full sub-slab depressurization. The results are attached and marked Attachment "B".

9. If any other post testing of internal product is required by any governmental office, it will be at a separate bid by our company, based on the requirement set by the agency.

10. Note: A company maintenance program is strongly suggested and made available through the company. This would be separately contracted.

TOTAL COST OF ALL THE WORK NECESSARY TO THIS PROJECT

Six thousand, nine-hundred and seventy dollars. ($6,970.00).

Down payment and diagnostic payment $4,060.00

Balance due and owing as of 110415 $2,910.00

Invoice attached for your attention, Attachment "B"

Thank you for utilizing our environmental services.

Respectfully submitted by:

Thomas J. Heine and Erik V. Heine
Radon Abatement owners and representatives

ATTACHMENT "B" 100415
FINAL DEPRESSURIZATION TESTING
Post-SSD Vapor extraction installed 102115

Jagemann Plating Co. 1324 S. 26th Street;
Manitowoc, WI 54220
Michael Jageman Ex VP 920-682-6883
Temp 47F ExBP 12.231 INT BP 9.847
LL Education Centre; Storage; SM office; Utility RM
Micromanometer readings were in inches of water column; Infitec DM1 readings

VPP A MMR -0.631
VPP B MMR -1.421 SSD DROP POINT
VPP C MMR -0.136
VPP D MMR -0.289
VPP E MMR -0.601
VPP F MMR -0.246
VPP G MMR -0.024
SUMP MMR -0.234

The entire sub-slab appears to be efficiently depressurized and ventilating

APPENDIX C

System Photographs

PHOTO 1

Site: Jagemann Plating Company

City/State: Manitowoc, Wisconsin

Comments: View of the SSDS RadonAway Fan and disconnect.

PHOTO 2

Site: Jagemann Plating Company

City/State: Manitowoc, Wisconsin

Comments: View of the SSDS discharge stack

PHOTO 3

Site: Jagemann Plating Company

City/State: Manitowoc, Wisconsin

Comments: View of the extraction point in basement.

PHOTO 4

Site: Jagemann Plating Company

City/State: Manitowoc, Wisconsin

Comments: View of u-tube manometer.

APPENDIX D

Inspection and Repair Logs

JAGEMANN PLATING COMPANY

1324 S. 26TH STREET

MANITOWOC, WI

WDNR BRRTS No. 02-36-555544

VMS Annual Inspection log

SYSTEM COMPONENT					ANNUAL INSEPECTION	
Name/Photo	WHAT DOES IT DO?	WHAT DO I CHECK?	WHAT SHOULD I SEE?	WHAT TO FIX?	DATE	NOTES
Fan 	Fan creates a vaccum and lowers pressure below foundation. The fan also removes soil gases from below foundation for discharge to atmosphere.	Fan Operation Fan Location Motor Noise	Fan is on Fan mounted outside & secure Fan motor is quiet (loud motor may indicate problem)	Fan may need to be replaced every 10 to 20 years. Replacement fan to have similar specifications as original with respect to flow and vacuum. ORIGINAL = Model RP265		
Suction Point 	Soil gases are collected in drain tile below the foundation, and tight seal prevents soil gas from getting inside the structure. Pipe conveys the vacuum from the fan, and collects soil gases for discharge to the atmosphere.	Pipe and Floor Seal Integrity		Floor seals or vent pipe may need to be re-sealed or replaced if cracks or leaks appear. See NOTE below regarding pipe alternations. Have professional test pressures if pipes are modified		
Manometer or Differential Pressure Gauge 	Measures differential pressure between vacuum side of vent pipe and indoor space. This measurement confrims there is a vacuum being pulled by the fan.	Vent Pipe Condition Liquid Level on Manometer	Floor seal is air tight around edge and at pipe penetrations. Liquid level in manometer is between 0.2 and 1.0 on the right-hand side.	A change in liquid level inidicates a change in the vacuum below foundation. This could be caused by failure of fan, blockage of vent pipe, change in water level below building, or other conditions. Troubleshoot or hire professional to identify cause and repair if		
Outdoor Vent Pipe 	Pipe carries soil gas outside and vents them to the atmosphere.	Vent Pipe Condition Vent Pipe Location	Vent pipe remains connected to fan. End of pipe free from obstructions. The exhaust is more than 15 feet from windows or	Vent pipe may require replacement, or cleaning to remove ice or debris. See NOTE below regarding pipe alternations. Have professional test pressures if pipes are modified.		
Foundation Floor 	The basement foundation is an important barrier that minimizes soil gas entry into building, and helps the fan to work efficiently.	Foundation Condition Foundation Footprint	No penetrating cracks or holes in foundation below grade. Check if there have been alterations or additions to building.	Seal cracks or other penetrations as you would to prevent water from entering. If building floor plan has changed, contact a professional contractor and/or the DNR to evaluate if modifications to the vapor mitigation system are neccessary.		
Test Point Vapor Pin 	This is a sample port to measure vacuum or collect soil gas sample(s) if needed.	Pin Seal/Cap Pin Condition	Vacuum measured with a manometer at vapor pin should be greater than -0.004 in H20. Pin is sealed and capped when not in use.	If system maintenance is required, professionals may test negative pressure using this port. Permanently seal hole if vapor pin is ever removed.		

NOTE: Minimize alternations to vent pipes. Changes to fittings, diameter, material type, or number of bends, can cause pressure losses that make system less effective.

Submitt form with Annual reporting to the WDNR

JAGEMANN PLATING COMPANY

1324 S. 26TH STREET

MANITOWOC, WI

WDNR BRRTS No. 02-36-555544

VMS Annual Inspection log

Office HVAC Thermostats

Thermostat	1-May	Year	Fan Setting to On	Fresh Air Intake Open	15-Aug	Year	Fan Setting	Fresh Air Intake Open	Inspector - Name and Company
			yes or no				yes or no		
South Office									
Basement									
North Office									
Breakroom									

Submitt form with Annual reporting to the WDNR

JAGEMANN PLATING COMPANY

1324 S. 26TH STREET

MANITOWOC, WI

WDNR BRRTS No. 02-36-555544

VMS Annual Inspection log

SSDS Data Collection

Date	TP-1	TP-2	TP-3	U-Tube	Flow	Pipe Size	Temp	Notes
mm/dd/yy	Inches of Water				FPM	4"	F	

Submitt form with Annual reporting to the WDNR

JAGEMANN PLATING COMPANY

1324 S. 26TH STREET
MANITOWOC, WI
WDNR BRRTS No. 02-36-555544
VMS Annual Inspection log

Plating Facility Mechanical Systems

	Monthly Inspection (date)	# of days down	Notes regarding down time or repairs to any Plating or warehouse mechanical systems	
Scrubber #1				
Scrubber #2				
Exhaust Unit #3				
Exhaust Unit #7				
Exhaust Unit #9				
Warehouse MAU #1				
Plant MAU #1				

Daily operation is expected, monthly recording should occur the first business day of each month.
Submit form with Annual reporting to the WDNR