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FIFTH FIVE-YEAR REVIEW REPORT FOR RIPON CITY LANDFILL SUPERFUND SITE FOND DU LAC COUNTY, WISCONSIN

Prepared by

Wisconsin Department of Natural Resources
Milwaukee, Wisconsin

For

U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

8/3/2021

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Douglas Ballotti, Director
Superfund & Emergency Management Division
Signed by: DOUGLAS BALLOTTI

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BOTW	BRRTS on the Web
BRRTS	Bureau for Remediation and Redevelopment Tracking System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
CO	Continuing Obligation
1,2-DCE	cis-1,2-dichloroethene
EPA	United States Environmental Protection Agency
ES	Enforcement Standard
FS	Feasibility Study
FFS	Focused Feasibility Study
FYR	Five-Year Review
ICs	Institutional Controls
LEL	Lower Explosive Limit
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PAL	Preventative Action Limit
PCE	Tetrachloroethene
PCOR	Preliminary Close-Out Report
PFAS	Per- and polyfluoroalkyl substances
PHA	Public Health Assessment
PRP	Potentially Responsible Party
RAOs	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
Site	Ripon City Landfill Superfund Site
TCE	Trichloroethene
UCL	Upper Confidence Level
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound
WAC	Wisconsin Administrative Code
WDNR	Wisconsin Department of Natural Resources
WRRD	Wisconsin Remediation and Redevelopment Database

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The Wisconsin Department of Natural Resources (WDNR) prepared this FYR report for the United States Environmental Protection Agency (EPA) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 (Appendix A, Reference 1), consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy (Appendix A, Reference 2).

This is the fifth FYR for the Ripon City Landfill Superfund Site ("Site"). The triggering action for this statutory review is the fourth FYR completion date of July 6, 2016 (Appendix A, Reference 3). The FYR report has been prepared because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of two Operable Units (OUs), which are both addressed in this FYR report. OU1 addresses the landfill and OU2 addresses groundwater. In this FYR report, the term "Property" is used to refer to the three parcels that make up the landfill property where the waste mass is located.

The Ripon City Landfill Superfund Site FYR was led by B.J. LeRoy with the WDNR. Mary Tierney is the EPA Remedial Project Manager. WDNR notified the potentially responsible party (PRP) group contact Jeff Tracy (Geosyntec) and the City and Town of Ripon of the initiation of the FYR on July 6, 2020. The review began on September 1, 2020.

Site Background

The Site lies in rural Fond du Lac County, surrounded by mostly undeveloped land. Several areas around the Site are active sand and gravel mining operations. Today, the Site is a closed landfill with vegetative cover that is surrounded by a fence and woods. There are no development plans for the landfill and no known plans for developing any of the surrounding nearby areas. Originally operated as a gravel pit, several entities leased the land for waste disposal in 1967. The City of Ripon operated the landfill until 1983, accepting municipal, commercial, and industrial solid wastes plus sludge from the Ripon wastewater treatment facility. Groundwater sampling in 1984 revealed volatile organic compounds (VOCs) in a nearby private water supply well. Several PRPs entered into a contract with WDNR in 1992 to conduct a remedial investigation/feasibility study (RI/FS), prepare a remedial design of the selected remedial action and implement the remedy at the Site.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION	
Site Name:	Ripon City Landfill
EPA ID:	WID980610190

Region: 5	**State:** WI	**City/County:** Town of Ripon, Fond du Lac County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: State ***[If "Other Federal Agency", enter Agency name]*:**		
Author name (Federal or State Project Manager): B.J. LeRoy, PG		
Author affiliation: Wisconsin Department of Natural Resources		
Review period: 9/1/2020 - 5/12/2021		
Date of last site inspection: FYR Site Inspection could not be completed due to COVID-19 work travel restrictions (last Site visit was on 8/14/2019)		
Type of review: Statutory		
Review number: 5		
Triggering action date: 7/6/2016		
Due date *(five years after triggering action date)*: 7/6/2021		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The PRP group conducted a RI/FS in 1994 (Appendix A, Reference 5). Although the Record of Decision (ROD) did not identify specific contaminants of concern (COCs), vinyl chloride, *cis*-1,2-dichloroethene (1,2-DCE), benzene, trichloroethene (TCE), and tetrachloroethene (PCE) were the five VOCs detected in groundwater at levels above State public health enforcement standards during the RI/FS. Iron and manganese were also detected in groundwater at levels above State public welfare enforcement standards. In addition, methane landfill gas was detected above 25 percent of the lower explosive limit during the RI/FS.

On March 30, 1995, the Wisconsin Division of Health completed a Public Health Assessment (PHA) of the Site (Appendix A, Reference 4). The PHA concluded that groundwater beneath and next to the Site was contaminated with VOCs and metals at concentrations that could pose a health hazard if this water were used for domestic purposes, such as drinking.

The RI identified a groundwater plume of mainly VOCs associated with the Site, migrating to the south and west. Landfill waste was not properly covered at the time. Landfill gas including both methane and VOCs also existed on-site. Based on these findings, the following potential risk pathways were identified for both human health and the environment:

- Direct contact with waste material;
- Consumption of contaminated groundwater;
- Inhalation of volatile contaminants through gas migration; and
- Contaminant runoff via surface water.

Response Actions

WDNR selected a remedy in the ROD (Appendix A, Reference 6) signed on February 26, 1996, and EPA concurred with the selected remedy and signed the ROD on March 27, 1996. The remedial action objectives (RAOs) included in the 1996 ROD, and developed based on both EPA and WDNR regulations, were to:

- prevent direct contact with landfill contents;
- reduce contaminant leaching to groundwater;
- control surface water runon, runoff and erosion;
- prevent off-site migration of landfill gas;
- restore groundwater quality to Wisconsin Administrative Code (WAC) NR 140 standards; and
- monitor groundwater quality, landfill gas and leachate for environmental control.

The selected remedy for OU1 included source control and long-term monitoring of both groundwater and landfill gas for methane and chlorinated VOCs in the TCE degradation pathway. Components of the selected remedy for OU1 from the 1996 ROD included:

- constructing a composite landfill cover (i.e., a landfill cap made with both a plastic membrane and soil materials) over the entire landfill;
- installing a passive landfill gas venting system as part of the composite cap to effectively vent landfill gas from the waste;
- monitoring of the groundwater quality to determine the effectiveness of the landfill cap towards improving groundwater quality;
- monitoring the landfill gas probes around the landfill to make sure that landfill gas is not migrating away from the Site in an uncontrolled manner;
- maintenance of the landfill cap to repair erosion that may develop;
- a deed restriction prohibiting disturbing the landfill cap except for maintenance purposes; and
- fencing of the landfill perimeter to restrict access.

The selected remedy for OU2 groundwater from the 1996 ROD was the No Action alternative. The ROD stated that the levels of contamination in groundwater that had migrated from this landfill were not severe enough to warrant active remedial measures to restore groundwater quality and that implementing the source control remedy would decrease migration of contaminants from the landfill into groundwater.

WAC Ch. NR 500 and NR 140 standards were established in the 1996 ROD as cleanup standards for contaminants in landfill gas and groundwater. Wisconsin regulates groundwater contamination under WAC Ch. NR 140, which has two criteria to apply to contaminant levels. One is the Enforcement

Standard (ES), which is typically equivalent to the federal maximum contaminant level (MCL) under the Safe Drinking Water Act. Actions must be taken if levels exceed ESs. The second standard, the Preventative Action Limit (PAL), is more stringent than the ES and serves as an indicator of a potential problem if the contaminant levels increase above it. Secondary ESs and PALs exist for aesthetic criteria like chloride and manganese. Table 1 below shows the ES and PAL criteria for five VOCs and the Secondary ES and PAL criteria for two inorganics.

Table 1: Groundwater Cleanup Criteria for Potential COCs

Contaminant	Cleanup Criteria	Type of Criteria
Inorganics	Unit - mg/L	
Iron	0.3/0.15	Secondary ES/PAL
Manganese	0.05/0.025	Secondary ES/PAL
Organics	Unit - µg/L	
Benzene	5/0.5	ES/PAL
1,2-DCE	70/7	ES/PAL
PCE	5/0.5	ES/PAL
TCE	5/0.5	ES/PAL
Vinyl chloride	0.2/0.02	ES/PAL

Status of Implementation

The PRPs completed construction of the cap, installation of the passive gas venting system, construction of a boundary fence, and installation of additional groundwater and landfill gas monitoring points in 1997. Long-term monitoring of groundwater began in 1996.

Source Control Measures

Construction drawings dated February 5, 1997 (Appendix A, Reference 7) document completion of required Site source control remedies, including construction of the landfill cover, leachate monitoring wells, gas vents and perimeter fence.

Groundwater Monitoring

Long-term groundwater monitoring began in 1996 and continues as of 2021 on a quarterly basis. A total of 30 wells are used for monitoring groundwater both on and off the source property. To better define the extent of the plume to the southwest of the Site, two additional monitoring wells were installed in November 2016 and August 2017 to monitor VOC migration in that area.

Additional Actions

Due to increasing landfill gas concentrations and the discovery of vinyl chloride in two private drinking wells approximately 1,600 feet downgradient of the Site in 2004, the PRP group proposed additional investigation. The PRPs completed a Focused Feasibility Study (FFS) (Appendix A, Reference 8) to evaluate actions for remediating landfill gas and groundwater at the Site. As a result of this study, the PRPs constructed an active gas extraction system as an interim action (2006) (Appendix A, Reference 9) and connected a number of residences to the City of Ripon municipal water system (2004). Two additional residences were connected to municipal water in 2015 (Appendix A, Reference 10). The

active gas extraction system and the municipal water connections remedies that were implemented for the Site were not included in the 1996 ROD selected remedy; therefore, WDNR and EPA plan to issue a decision document incorporating and documenting these additional remedial actions taken as part of the Site remedy.

In 2012, the PRPs completed an updated FFS to evaluate options for groundwater remedial actions, including monitored natural attenuation (MNA). To address some inadequacies in the lines of evidence for MNA in the 2012 report, the PRP group continued to monitor Site groundwater and submitted a preliminary MNA evaluation report in January 2021. The PRP group will be submitting a Supplemental MNA Evaluation report. After reviewing the report, EPA and the WDNR will make a determination about whether MNA would be an effective remedy for groundwater at the Site.

Institutional Controls

Institutional controls (ICs) in the form of deed and land use restrictions are required by the 1996 ROD to restrict property use, maintain the integrity of the remedy, and assure the long-term protectiveness for areas which do not allow for UU/UE. Although the 1996 ROD does not require ICs related to groundwater, several controls related to groundwater use either were already in existence at the time of the ROD or have been enacted or implemented since that time. WDNR plans to also incorporate the need and requirement for these ICs related to groundwater as part of the Site remedy when it issues the new decision document. Table 1 lists a summary of planned and implemented ICs for the Site. The Site IC plan was last updated in 2011 (Appendix A, Reference 11). A map showing the area in which the ICs apply is included in Appendix B.

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Waste/soil areas, air	Yes	Yes	Landfill Properties (3 parcels)	Prohibit certain specified Site uses, including any use that might damage or impair the effectiveness of a remedy component or interfere with the performance of the remedial work.	Declaration of Restrictions, recorded on October 21, 1997 at the Register of Deeds for Fond du Lac County for the Site property. WAC Ch. NR 506.085 (Appendix A, Reference 12) regulates closed landfills and prohibits using the waste disposal area for agricultural purposes, constructing any buildings over the waste disposal area, and excavating the final cover or any waste materials, unless a variance is granted by the WDNR (1996). The Site is listed in the WDNR Wisconsin Remediation and Redevelopment Database (WRRD) as a site with ongoing cleanup that has continuing obligations (COs) (established in 1996; listed August 12, 2010).

					Additional COs planned for landfill Property and for off-Property parcels. (Not yet implemented.)
Groundwater	Yes	No	Well Installation Restriction Area (Appendix B)	Prohibit installation of water wells, other than monitoring or leachate wells, on the Site and throughout the area of contaminated groundwater.	Declaration of Restrictions recorded on October 21, 1997 at the Register of Deeds for Fond du Lac County for the Site property which prohibits water wells on the landfill property. WAC Ch. NR 812.08 (Appendix A, Reference 13) forbids construction of a potable or non-potable well within 1,200 feet of a landfill. WAC Ch. NR 812.43 requires that any property development, either residential or commercial, which could entail construction of private water supply well systems within the minimum separation distance to the landfill can only be constructed following receipt of a variance from the WDNR (January 1991). Pursuant to WAC Ch. NR 812.12(3), the WDNR issued memoranda dated July 15, 2004, to Wisconsin licensed well drillers that imposed a "Special Well Casing Pipe Depth Area" for an area surrounding and containing the landfill that covers approximately 1.5 square miles. The Site is listed in the WDNR WRRD as a site with ongoing cleanup that has continuing obligations (August 12, 2010). Agreements between PRPs and homeowners who are attached to the municipal water supply include requirements to have their water supply well abandoned or converted to a groundwater monitoring well (assumed date of November 2002 when municipal

					water line was installed, July 2015, and September 2015). Local ordinance was modified in 2019 to remove a special exemption allowing groundwater extraction at non-metallic mines within 1,200 feet of the landfill. Groundwater extraction is now prohibited within the 1,200-foot setback (Town of Ripon Zoning Ordinance, Section 4.604 - Nonmetallic Mining, Paragraph C (adopted December 15, 2014; revised May 13, 2019)). Additional COs are planned for landfill Property and off-Property parcels where contamination in groundwater exceeds standards. (Not yet implemented.)

Status of Access Restrictions and ICs

In addition to the access restriction provided by a locked fence that encloses the landfill, the Ripon City Landfill Site has a number of ICs. The IC instruments implemented for the Site include: Wisconsin statute WAC Ch. NR 506.085, 812.08, 812.12, and 812.43, restrictive covenants on the landfill Property, a local ordinance (Town of Ripon Zoning Ordinance, Section 4.604 - Nonmetallic Mining), site listing on Wisconsin's WRRD, and agreements between PRPs and homeowners attached to the municipal water supply that include requirements to have their water supply well abandoned or converted to groundwater monitoring.

WAC Ch. NR 812.08 (Appendix A, Reference 13) prohibits construction of a potable or non-potable well within 1,200 feet of a landfill. WAC Ch. NR 812.43 requires that any property development, either residential or commercial, which could entail construction of private water supply well systems within the minimum separation distance to the landfill can only be constructed following receipt of a variance from the WDNR.

The Special Well Casing Area designation has been in place since 2004. The 2004 WDNR memorandum imposed a "Special Well Casing Pipe Depth Area" pursuant to WAC Ch. NR 812.12(3). The area applies to the extent of the groundwater contaminant plume and covers approximately 1.5 square miles. Requirements apply to the construction of new wells and the reconstruction of existing wells throughout this area. No additional wells have been installed within the Special Well Casing Area during the last five years. The Inner and Outer Special Well Casing Areas cover approximately 240 acres and approximately 800 acres, respectively.

A Declaration of Restrictions was recorded on October 21, 1997 at the Register of Deeds for Fond du Lac County for the Site property. The Declaration of Restrictions prohibits certain Site uses, including any use that might damage or impair the effectiveness of a remedy component or interfere with the performance of the remedial work.

Two other IC layers in place that pertain to the landfill are based on State code. WAC Ch. NR 506.085 (Appendix A, Reference 12) regulates closed landfills and prohibits using the waste disposal area for

agricultural purposes, constructing any buildings over the waste disposal area, and excavating the final cover or any waste materials, unless a variance is granted by the WDNR. In addition, the waste mass in the landfill is governed by WAC Ch. NR 500 (Solid Waste Management). Changes to the waste mass area that require approval from the WDNR prior to implementation include:

- removal of the existing barrier, cover or any waste materials;
- replacement with another barrier or cover;
- excavating or grading of the land surface;
- filling on covered areas;
- plowing for agricultural cultivation
- construction or placement of a building or other structure; and
- changing the use or occupancy of the Property to a residential exposure setting, which may include certain uses such as single or multiple family residences, a school, day care, senior center, hospital, or similar residential exposure settings.

A township ordinance also acts as an additional IC at the Site. During the 2016 FYR, WDNR personnel became aware of groundwater extraction taking place at two adjacent properties, both of which have operating sand and gravel mining businesses. Since the 2016 FYR, WDNR negotiated with both entities to cease groundwater extraction. In addition, the Town of Ripon modified its zoning ordinance in 2019 (Appendix A, Reference 16), which removed an exemption for groundwater extraction within a 1,200-foot radius of the landfill for mining purposes. Groundwater extraction is now prohibited within the 1,200-foot setback.

Current Compliance

Based on a review of the data over this FYR period, the remedy appears to be functioning as intended. Site visits over the past five years and discussions with PRP representatives confirmed that Site uses are consistent with the implemented ICs and remedy IC objectives. No additional wells have been installed within the Special Well Casing Area during the last five years.

IC Follow-up Actions Needed

Another type of IC instrument the WDNR uses to restrict property use to protect potential receptors and the environment are Continuing Obligations (COs). This type of IC has not been implemented at the Site but is planned. COs are considered government controls and informational devices. As governmental controls, State administrative codes are used to impose obligations on properties with residual contamination. COs also serve as informational devices because the sites are listed in a public database in order to provide notice to interested parties about the residual contamination and any associated obligations.

Although off-Property residents and landowners were notified in 1996 of use restrictions that applied to their properties and a Declaration of Restrictions is in place for the landfill Property, WDNR will be implementing COs at the Property and at several parcels off-Property that are within the extent of the groundwater contaminant plume to comply with State requirements for ensuring protectiveness. Based on updated CO recording practices, the landfill Property owners as well as off-Property parcel owners will be notified about COs specific to their properties. As part of the process, the owners will have the opportunity to comment on applied COs after notifications are issued. The types of requirements in the planned COs are described below.

The CO requirements for the three parcels that comprise the landfill Property will include the following statements and requirements:

- Groundwater contamination is present above WAC Ch. NR 140 enforcement standards (ESs) (Appendix A, Reference 14).
- Waste/residual soil contamination exists that must be properly managed should it be excavated or removed.
- The current landfill cover must be maintained. Any proposed changes to the cover must have prior written approval from the WDNR. Any residual soil contamination resulting from excavation or soil removal must be properly managed.
- The landfill gas system must prevent the migration of landfill gasses.
- Waste and soil contamination could result in vapor intrusion if future construction activities were to occur. If this were to occur, vapor control technologies would be required for occupied buildings, unless the Property owner assesses the potential for vapor intrusion and the WDNR agrees that vapor control is not needed. Currently, no occupied buildings exist on the Property, and no landfill gas has been detected off-Property.
- The Property is currently zoned for industrial use and may be used only as a landfill without prior approval from the WDNR.
- Annual inspections are required for compliance with these COs.

The COs for off-Property parcels where groundwater results show ES exceedances will include the following advisory statements and obligations:

- Continued groundwater monitoring is required. The ROD specifically states that the plan must ensure that the landfill "does not affect nearby private wells."
- Groundwater contamination migrating beyond the source property may create the possibility of vapor intrusion to private residences or other structures. Vapor must continue to be evaluated per WAC § 716.07 for potential required action through the quarterly, annual, and five-year reviews.
- Prior WDNR approval is required before a new well can be constructed within 1,200 feet of the source property. Further well construction advisory areas are included in Appendix B.
- Unused monitoring wells must be properly abandoned per WAC Ch. NR 141.

The IC Plan (Appendix A, Reference 11) prepared by the PRPs in 2011 and approved by EPA and WDNR on April 13, 2012 includes a summary of ICs in place for the Site. To ensure continued protectiveness, WDNR and EPA will require the PRPs to update the IC Plan after the COs are implemented to add a description of the COs and to include long-term stewardship procedures such as regular inspections of engineering controls and access controls, review of planned or anticipated land use around the Site, and annual certifications of compliance with ICs and IC effectiveness.

Systems Operations/Operation & Maintenance

Since the 2016 FYR, the PRPs continue to conduct required operation and maintenance (O&M) activities at the Site, including routine monitoring, inspections, and quarterly reporting. The PRPs conduct inspections periodically throughout the year, and a representative of the PRP group conducts biweekly drive-by inspections of the landfill property and fencing. Site inspections of the gas/leachate wells, gas probes and groundwater monitoring wells are completed during each monitoring event by PRP consultants. Gas monitoring points are inspected every two weeks and monitoring wells are inspected quarterly. The landfill cap is formally inspected once each year.

Groundwater
To monitor groundwater, water levels are measured at 30 monitoring wells at various times throughout the year. The O&M activities include semi-annual sampling at 19 standard monitoring wells and two monitoring wells converted from residential wells. Currently, the groundwater sampling analysis includes field measurements, VOCs, and MNA parameters. Samples from three leachate wells are also analyzed for VOCs. Maps in Appendix D show the monitoring well network.

Landfill Gas
An active gas extraction system, including gas probes (outside the landfill), gas vents (inside the landfill), leachate wells, piping, and pump house, continues to monitor and remove gas from the waste mass. Landfill gas monitoring routinely occurs with gas samples collected from ten gas probes, two gas vents, three leachate wells, and the system exhaust. Landfill gas samples are analyzed for percent-volume concentrations of methane, carbon dioxide, and oxygen. Biweekly landfill gas monitoring continues to take place at the monitoring locations within the waste mass. Gas samples from five locations are also analyzed for VOCs. Since 2013, gas monitoring and VOC analyses of samples from the gas probes have taken place annually. During this FYR period, no significant issues were identified related to the landfill gas system.

The PRP group monitors the Site biweekly and repairs the gas system as problems arise. Minor leaks at gas probes and leachate head wells are routinely repaired and reported on a quarterly basis. All reports are linked at the WDNR Bureau for Remediation and Redevelopment Tracking System webpage ("BRRTS on the Web" (BOTW)). No major shutdowns of the gas extraction system occurred during the five-year period. Temporary shutdowns occurred during minor repairs of wells or probes.

The operation of the gas extraction system is seasonally adjusted to maximize landfill methane gas extraction while minimizing the introduction of atmospheric oxygen in order to maintain oxygen levels less than 5 percent. O&M staff rotate the gas vent extraction points based on measurements from previous monitoring events, connecting two to three vents at a time. Figure 2 in Appendix D shows the gas vents eligible to be connected to the system. As methane levels are reduced at connected gas vents, extraction points are rotated through the 12 gas vents to increase system efficiency and remove the highest measured VOC and methane concentrations. There are no buildings or confined spaces within the landfill/source area property.

Waste Mass/Landfill Cap
Since 2016, quarterly reports indicate no landfill cap breaches, sinks or seeps. The cap is inspected annually and is viewed at least biweekly when not covered by snow. The cap system continues to limit infiltration with a controlled drainage layer. When functioning properly, the drainage layer removes water from the landfill area before it can infiltrate the waste mass.

In 2019, personnel observed that the drainage layer occasionally created ponding just off the landfill area to the southeast. The PRP group created an additional drainage swale to alleviate the ponding. The swale became established with grass in 2020, and ponding ceased. Appendix D includes photo documentation of the repaired drainage swale. Further information exists in the 2020 3rd quarter report.

In 2020, Site inspectors discovered ponding southeast of the landfill and identified a drainage pipe as the main contributor. The landfill's sand drainage layer, above the compacted clay and geomembrane, moves surface water from the geomembrane to surface water control features like swales and ditches.

The PRP group reconstructed the area just outside the landfill cover and waste mass and added an additional surface water swale on September 23, 2020. The change reduced ponding, and the landfill cap integrity was not compromised at any time.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

Table 2: Protectiveness Determinations/Statements from the 2016 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The remedy for OU1 at the Ripon City Landfill Site currently protects human health and the environment because the remedy is functioning as intended and the landfill cap has been maintained. An active gas extraction system installed in 2006 is operating as planned. However, in order for the remedy to be protective in the long term, WDNR should issue a decision document to incorporate the active gas extraction system into the Site remedy.
2	Short-term Protective	The remedy for OU2 at the Ripon City Landfill Site currently protects human health and the environment because groundwater monitoring results show that exposure pathways that could result in unacceptable risks are currently under control and nearby residences have been connected to the municipal water supply. However, in order for the remedy to be protective in the long term, the following actions should be taken: the WDNR should issue a decision document to incorporate the connection of the nearby residences to the municipal water supply into the Site remedy; the PRPs should conduct a Supplemental MNA Evaluation to review the effectiveness of MNA as a groundwater remedy; the PRPs should install a sentinel monitoring well downgradient of the Site; the PRPs should review the adequacy of the groundwater monitoring network to determine whether any additional wells are needed; and WDNR should issue a decision document to select MNA as the final groundwater remedy if it is determined to be effective. The PRPs should also conduct a review the effectiveness of current ICs, including the ICs for preventing dewatering activities in the vicinity of the landfill and for preventing the installation of wells beyond 1,200 feet from the landfill boundary. The PRPs should update the IC Plan to include plans for long-term stewardship of ICs and, if necessary, implement additional ICs.
Sitewide	Short-term Protective	The remedy at the Ripon City Landfill Site is currently protective of human health and the environment because the remedy is functioning as intended. Groundwater and landfill gas monitoring results and the connection of nearby residences to the municipal

		water supply show that exposure pathways that could result in unacceptable risks are currently under control. However, in order for the remedy to be protective in the long term, the following actions need to be taken: the WDNR should issue a decision document to incorporate the installation of the active gas extraction system and the connection of the nearby residences to the municipal water supply into the Site remedy; the PRPs should conduct a Supplemental MNA Evaluation to review the effectiveness of MNA as a remedy; the PRPs should install a sentinel monitoring well downgradient of the Site; the PRPs should review the adequacy of the groundwater monitoring network to determine whether any additional wells are needed; and WDNR should issue a decision document to select MNA as a final groundwater remedy if it is shown to be effective. In addition, to ensure long-term protectiveness, the PRPs should conduct a review of the effectiveness of the current ICs, including the ICs for preventing dewatering activities in the vicinity of the landfill and for preventing installation of wells beyond 1,200 feet from the landfill boundary. The PRPs should update the IC Plan to provide for long-term stewardship of ICs, and if necessary, implement additional ICs.

Table 3: Status of Recommendations from the 2016 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1/2/Sitewide	The WDNR has not issued a decision document to incorporate the active gas extraction system and the municipal water connections into the Site remedy.	The WDNR should issue a decision document to incorporate these additional remedial actions into the Site remedy.	Addressed in Next FYR	Due to staffing changes and workload issues, WDNR was unable to complete a decision document. WDNR will draft a decision document scheduled for completion in 2024. The decision document will also address groundwater ICs and identify COCs. This has been included as an issue/recommendation of this FYR.	NA
2	Although the overall area of groundwater contamination has been stable, contamination has been identified in wells that previously had	The PRPs should conduct a Supplemental MNA Evaluation to review the effectiveness of MNA as a remedy. This evaluation will supplement the analyses of MNA and several active	Addressed in Next FYR	The PRP group installed two additional downgradient wells that define the plume boundary. The wells remain in the monitoring program and are evaluated on a quarterly basis. The PRP group completed a Preliminary MNA	NA

	non-detect results. Monitoring parameters provide some indications that MNA may be an effective remedy; however, EPA has questions about the adequacy of the lines of evidence supporting MNA at the Site.	remedies presented in the 2012 FFS and will include installation of a sentinel monitoring well. If MNA is shown to be effective, the WDNR should issue a decision document to select it as the final groundwater remedy.		Evaluation in the 2020 fourth quarter O&M report, which was submitted to WDNR and EPA and shows that many indicators exist that point to MNA as a potential remedy. The PRPs will be required to submit a Supplemental MNA Evaluation report. Based on a review of the report, the WDNR and EPA will determine whether MNA is an effective remedy. If MNA is determined to be effective, the WDNR will complete a decision document to select it as the final groundwater remedy.	
2	Dewatering activities have occurred in the vicinity of the landfill and may have caused groundwater flow direction to change.	The PRPs should review the adequacy of the groundwater monitoring network to determine whether any additional wells are needed.	Complete	Two wells were installed in 2016 and 2017 (P-117 and P-118).	November 2016 and August 2017
2	ICs currently in place may not be adequate to prohibit installation of residential wells in the area of the groundwater plume and to prevent dewatering activities in the vicinity of the landfill, and the IC Plan may need modifications to provide for long-term stewardship of ICs.	The PRPs should conduct a review of the effectiveness of the current ICs to prevent dewatering activities in the vicinity of the landfill and to prevent the installation of wells beyond 1,200 feet from the landfill boundary. The PRPs should update the IC Plan to include plans for long-term stewardship and, if necessary, implement additional ICs.	Complete	The WDNR negotiated with the town board to revise the town ordinance regarding off-Property groundwater extraction within 1,200 feet of the landfill. No groundwater extraction occurs in this area, and the existing monitoring wells demonstrate that the plume has not expanded onto neighboring properties due to the previous extraction. The IC Plan will be updated to include a plan long-term stewardship; this is an issue and	May 13, 2019

				recommendation of this FYR.	

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On April 8, 2021, a public notice was made available by WDNR by an advertisement in the *Ripon Commonwealth Press* announcing that the FYR was in progress. The public notice indicated that questions and comments about the status of the cleanup at the Site could be directed to the WDNR Project Manager B.J. LeRoy. No comments were received. The public notice is included in Appendix C. The results of the review and the report will be made available on the WDNR BOTW webpage https://dnr.wi.gov/botw and on request. A copy may also be sent to the Ripon Public Library located at 120 Jefferson Street, Ripon, WI.

In February of 2019, WDNR assigned this Site to Project Manager, B.J. LeRoy (WDNR). On January 21, 2021, Mary Tierney (EPA), B.J. LeRoy (WDNR), Jeff Tracy (GeoSyntec, PRP group) met virtually as a kick-off meeting for the FYR. WDNR indicated that the overall impression was that the remedial activities at the Site were functioning as intended and recommendations for future Site changes would be minimal.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date**.** B.J. LeRoy interviewed Jeff Tracy, the PRP group representative, on multiple occasions. The PRP representative stated that the overall impression was that the remedial activities at the Site were functioning as intended. The PRPs stated that they felt that communication with EPA and the State was adequate. Both consulting entities (GeoSyntec, TRC) continue to provide detailed quarterly reports that document rigorous monitoring, and O&M. Stephen Sellwood took over as the TRC Project Manager during 2021 and has continued the reporting process as required.

Data Review

The following documents provided the data reviewed for this report. Some of the quarterly reports summarize data collected over two periods. In these cases, the report name is based on the later of the two quarters.

- 2016 – 4th Five Year Report (Appendix A, Reference 3)
- 2016 – 2nd, 3rd, and 4th quarter reports (Appendix A, Reference 16, 17, 18)
- 2017 – 1st, 2nd, and 3rd quarter reports (Appendix A, Reference 19, 20, 21)
- 2018 – 1st, 2nd, 3rd, and 4th quarter reports (Appendix A, Reference 22, 23, 24, 25)
- 2019 – 2nd, 3rd, and 4th quarter reports (Appendix A, Reference 26, 27, 28)
- 2020 – 1st, 2nd, 3rd, and 4th quarter reports (Appendix A, Reference 29, 30, 31, 32)
- 2020 – Vapor Intrusion Assessment (Appendix A, Reference 33)

Landfill Gas

An active gas extraction system, including gas probes (outside the landfill), gas vents (inside the landfill), leachate wells, piping, and pump house, continues to monitor and remove gas from the waste mass. Figure 2 in Appendix D shows the gas vents and probes in the monitoring system. Appendix D also includes gas monitoring data from 2020. WAC Ch. NR 506.07(4) requires that methane concentrations greater than the lower explosive limit (LEL) (5 percent) should not occur outside the limits of the wastes. During this FYR period, no concentrations of methane above 5 percent were observed in monitoring points outside of the waste limits.

Biweekly measurements at probes and wells provide percent methane, carbon dioxide, oxygen, and balance gas (mostly nitrogen). The gas probes show that landfill gas is not observed at off-Property locations, which indicates that the gas collection system functions appropriately. Ten gas probes surround the landfill, mostly off-Property. Methane was not detected off-Property during 2020 at nine probes. GP-1, which is outside of the waste but on the Site Property, showed detects below 1 percent once during the first quarter of 2020 and four times during the 3rd quarter of 2020.

Gas vents and leachate extraction wells are also monitored for methane. Gas extraction remains consistent at the leachate wells and is rotated between various gas vents located in waste. Leachate head wells LC-1 and LC-3 typically remain below 5 percent and 10 percent methane respectively. During the 4th quarter of 2020, methane concentrations were slightly higher at both wells, near 10 and 20 percent, respectively. LC-2 typically ranges between 18 and 35 percent methane and displays no apparent seasonal fluctuations. Moderate increases in methane at other leachate wells are typically seen in the late summer to early fall months. During 2020, GV-4 was typically below 5 percent methane, and GV-6 was typically below 10 percent. No seasonal fluctuation is apparent in these gas vents. Except for during a minor system leak that was repaired in 2019, methane production levels remained relatively consistent through the five-year period. Appendix D includes gas monitoring data from 2020.

In addition, landfill gas concentrations are monitored annually to assess VOC concentrations. VOCs routinely exist at five of 25 monitored locations. The one off-Property monitoring point where low concentrations of VOCs are observed is GP-3, which is approximately 100 feet south of the southwest corner of the landfill. No VOCs, however, were detected at GP-7, which is just south of GP-3. One gas vent in the middle of the landfill, GV-6, routinely shows slightly elevated levels of fluoromethanes. Leachate wells LC-1, LC-2, and LC-3, which are also located on the landfill, typically contain a range of VOCs, including TCE, vinyl chloride, fluoromethanes, and petroleum VOCs. Other than GP-3, no probes outside the landfill show detectable VOC concentrations. The levels of VOC concentrations measured during this FYR period were similar to those in the past; however, the units in which the results are submitted do not facilitate comparison with State emissions standards. The PRP group will be resubmitting the data so that the results are in comparable units and in a format that will facilitate review.

Groundwater Flow Patterns

The PRP group uses 30 wells to monitor groundwater in four general elevation ranges both within the landfill Property and throughout the extent of the plume. Monitoring includes water elevations and chemical analysis on a quarterly basis. Groundwater flow maps in Appendix E show groundwater flow directions in the four hydrogeologic or hydrostratigraphic layers or units. The unit designations are based on depth and do not indicate the presence of confining layers. Groundwater first occurs approximately 30 to 40 feet below ground surface. This shallow groundwater does not come into contact with the waste mass (although a small amount of leachate exists within the waste).

Flow maps created for each unit show consistent water elevations and flow directions in Layers 1, 2 and 3 during the most recent five-year monitoring period. Water in these top three units, which consist mostly of unconsolidated sand and gravel, flows with topography to the south and southwest in the direction of surface water features. In these three unconsolidated units, the groundwater flow pattern remains consistent through time. Vertical gradients are typically very slightly upward, which means that the downward migration of contaminated groundwater may be primarily due to dispersion processes.

While historical investigation reports have referred to four distinct stratigraphic units, water elevation data consistently indicates that the upper three units act as one hydrostratigraphic unit, with only slight variations in flow based on depth.

Layer 4 consists of Ordovician sandstone, beginning approximately 170 feet below ground surface. Locally the thickness of this unit is at least 150 feet; regionally the unit may be several hundred feet thick. The layer supplies groundwater to municipalities throughout the area and is an important source of groundwater for both drinking water and non-drinking water purposes. Local groundwater flow in Layer 4 varies due to influences from pumping of groundwater by the City of Ripon. The natural flow direction appears to be to the west/southwest. This flow pattern has typically been observed in the first, third and fourth quarters during the recent five-year period. Historic flow maps through time show that the flow direction during the second and sometimes the third quarter changes from west/southwest to the southeast. Layer 4 groundwater consistently flows southeast during summer months (primarily the second quarter), when the City reports that back-up municipal water supply wells are turned on due to increased demand. During winter months, the flow direction reverts to its natural westerly/southwesterly flow.

Beginning in 2016, the laboratory method used for vinyl chloride was based on a lower reporting limit, which resulted in additional detects above regulatory limits. Based on these data, WDNR asked the PRP group to make changes in monitoring practices that helped better delineate the plume. This led to additional wells (P-117, P-118) being installed to the southwest in 2016 and 2017, where vinyl chloride had previously not been detected due to the higher detection limit. With the additional wells included as part of the routine monitoring program, the western plume extent appears to be defined.

Groundwater Analytical Data

Quarterly laboratory analysis occurs per the approved groundwater monitoring plan, included in Appendix E. Samples are analyzed for VOCs and natural attenuation parameters. The monitoring well network appears to be effective in determining the nature and extent of the current VOC-contaminated groundwater. Sentinel wells which routinely have non-detect results for most VOCs are located to the southwest, south, and southeast, which are the three main groundwater flow directions. The one private well that still remains is located outside of the plume, approximately 2,000 feet to the south of the Site, and is sampled annually for Site VOCs. The private well had no detections above PAL or ES standards for Site VOCs during this FYR period.

Of the four monitoring well layers, wells in Layer 3 have historically had the most detections of VOCs. Over the past five-year period, wells in Layers 1 and 2 have shown only sporadic detections of VOCs. The monitoring frequency of most Layer 1 and 2 wells has been reduced to annual sampling. In Layer 4, only one well (P-107D), which is directly downgradient of the landfill, has shown vinyl chloride detections during this FYR period. Concentrations of vinyl chloride at P-107D have generally ranged from 2 to 4 µg/L, with a maximum of approximately 8 µg/L.

Levels of VOCs throughout the plume are typically around 10 µg/L or lower. In Site monitoring wells, vinyl chloride concentrations ranged between non-detect and around 10 µg/L, TCE concentrations ranged between non-detect and 2 µg/L, and 1,2-DCE concentrations ranged from non-detect to 3.5 µg/L. The ESs for vinyl chloride, TCE, 1,2-DCE are 0.2 µg/L, 5 µg/L, and 70 µg/L, respectively.

Because vinyl chloride has been the only VOC with exceedances of its ES, it has been the main VOC of concern in groundwater over the past five years. Appendix E includes graphs of vinyl chloride results from the late 1990s to the present. Appendix E also includes a vinyl chloride isoconcentration map for Layer 3 based on results from April 2020. The contamination plume for vinyl chloride extends to the south and southwest of the Site. The westernmost monitoring well, P-118, shows concentrations of vinyl chloride that are above the PAL (0.02 µg/L) but below the ES (0.2 µg/L).

In addition to vinyl chloride, manganese is the only other analyte that is consistently detected in several Site groundwater monitoring wells at concentrations above the WAC Ch. NR 140 ES (0.05 mg/L). The ES for manganese, however, is a secondary standard. Manganese occurs naturally in groundwater in Wisconsin, especially in the regional sandstone unit, and may not be Site related. Sporadic exceedances of the PAL for TCE, which is 0.5 µg/L, occur in wells that are near the waste mass. No exceedances of the ES for TCE, which is 5 µg/L, have been observed in Site wells during this FYR period.

Based on Mann-Kendall statistical analyses of data from 1997, when monitoring began, through the present, VOC concentrations appear to have generally declined with time over the monitoring history, as shown in concentration graphs in Appendix E, Figure 12. For most wells and COCs, data through June 2020 show decreasing trends. The only two increasing trends are for 1,2-DCE at P-111D and P-114. A summary of results for the primary VOC of concern in groundwater, vinyl chloride, is below. Concentration vs time graphs for these wells are in Appendix E.

- MW-103 and P-103 – directly downgradient of the landfill: Slightly above the ES; stable concentrations.
- P-107 – 250 feet downgradient of the landfill: Based on visual analysis, stable to slightly increasing trends over the last eight monitoring events.
- P-107D -- 250 feet downgradient of the landfill: Only Layer 4 (bedrock) well with vinyl chloride detect; similar to its nested well, P-107, concentrations of vinyl chloride appear to be slightly trending upward based on visual analysis.
- P-111D – 500 feet further downgradient from P-107/107D: Only slightly above the ES and concentrations appear to be decreasing.
- P-114 – 1,600 feet downgradient: Within subdivision; consistently shows the highest concentrations of vinyl chloride at around 10 µg/L, which is above the ES (0.2 µg/L); concentration appears to remain stable over time; all residents in the subdivision have been connected to City water.
- P-117 – approximately 1,600 feet to southwest of the Site: Installed in November 2016 to better define the western extent of the plume; concentrations are slightly above the ES and fairly stable over the past five years.
- P-118 -- west of P-117 in the direction of flow: Installed in August 2017 to better define the western extent of the plume; concentrations alternate between levels slightly above and below the PAL.

Definition of Plume to Southeast

Due to changing flow directions in Layer 4 and the limited number of Site wells to the southeast, it is unclear if future plume migration in this direction is fully characterized. Intermittent pumping of two City supply wells located approximately 0.5 mile (Municipal Well #9) and 1.5 miles (Municipal Well #6) from the Site makes the flow regime in this area somewhat unpredictable. The municipal wells are screened in bedrock (Layer 4). While the Site plume has not been shown to extend to Municipal Wells #6 and #9, both have historically shown the presence of VOCs such as TCE and tetrachloroethene. Several investigations of the contamination in the City wells have been conducted but the source(s) have never been identified. The Consumer Confidence Reports from 2017 through 2020 published by the Ripon Water Utility show that TCE has been detected in municipal water at levels above the PAL (0.5 µg/L) during each year. The reports did not specify the number of PAL exceedances.

Monitoring well (MW-3A), which is screened in bedrock and located between the Site and Municipal Wells #6 and #9, is sampled quarterly. No VOCs were detected in well MW-3A during this FYR period. The PRP will review the adequacy of the monitoring well network between the Site and the municipal supply wells to determine if additional monitoring well(s) are needed to better characterize potential plume migration in this area.

Preliminary Review of Natural Attenuation

The PRP group has included natural attenuation analyses in monitoring reports submitted in 2019 and 2020. Since monitoring began in 1997, concentrations of parent products such as TCE have decreased, particularly as the distance from the waste mass increases. Trend graphs at most wells show generally stable or decreasing concentrations of VOCs over this time period, and degradation of 1,2-DCE to vinyl chloride appears to be occurring. However, vinyl chloride is currently the main VOC of concern in groundwater, two wells (P-111D and P-114) show statistically increasing trends for 1,2-DCE, and two wells (P-107 and P-107D) show visually increasing trends for vinyl chloride over this FYR period. At other Site wells, trends in vinyl chloride are not evident. Robust statistical analysis specific to vinyl chloride has not yet been provided. Preliminary results for natural attenuation parameters show some indications that reducing environments are present in the subsurface in plume centerline wells (Appendix E, Table 8).

Overall Review of Groundwater Data

Overall, concentrations of Site contaminants have decreased over time throughout much of the Site plume. Manganese is the only inorganic analyte that is consistently detected in Site monitoring wells at concentrations above the secondary ES (0.05 mg/L). However, it is a metal that occurs naturally in groundwater in the regional sandstone unit and may not be Site related. Concentrations of TCE and 1,2-DCE are below ESs in Site wells. Vinyl chloride has been the only VOC with recent exceedances of its ES in Site wells and is the main VOC of concern in Site groundwater over the past five years. Over this FYR period, two wells (P-111D and P-114) show statistically increasing trends for 1,2-DCE, and two wells (P-107 and P-107D) show visually increasing trends for vinyl chloride. Preliminary results for natural attenuation parameters indicate that reducing environments are present in the subsurface in some areas, and groundwater data show that biodegradation is occuring to some extent. WDNR and EPA will be doing further review of the effectiveness of MNA as a potential groundwater remedy based on the Supplemental MNA Evaluation report that the PRPs will be submitting.

Vapor Intrusion

In 2020, the PRPs conducted an assessment of the potential for vapor intrusion based on long-term monitoring data of groundwater and landfill gas and locations of structures and residences in the vicinity

of the Site. Based on the low levels of contaminants in groundwater and the distance to the nearest structure from the Site (approximately 1,600 feet), it was determined that the risk of vapor intrusion concerns was highly unlikely.

Site Inspection

Due to travel restrictions associated with the COVID-19 pandemic, WDNR was unable to complete a FYR Site inspection. WDNR will complete a FYR Site inspection as soon as feasible. This has been included as an issue and recommendation of this FYR report.

Earlier Site inspections occurred on multiple dates. The intent of the inspections was to assess remedy protectiveness and confirm that the Site is being maintained according to O&M protocols. Table 4 lists inspections that occurred during 2019 and 2020.

Table 4 – Site Inspections

Inspection Date	Purpose	Attendees	Findings
8/14/2019	Site Inspection and Interviews	EPA – Andrew Kleist WDNR - B.J. LeRoy PRP Group Rep – Jeff Tracy Consultant (TRC) – Marita Stollenwerk City of Ripon Town of Ripon	Cap and fence in good working order. Gas extraction system in working order. Monitoring wells and gas probes generally in good condition.
10/7/2019	Drive by Inspection	WDNR – B.J. LeRoy	No changes in Site conditions were observed.
10/22/2020	Drive by Inspection	WDNR – B.J. LeRoy	No changes in Site conditions were observed.
Biweekly	Gas Monitoring and General Grounds	City and Town of Ripon O&M personnel	Gas monitoring completed; general maintenance notes collected.

A Site meeting and inspections were held August 14, 2019. Andrew Kleist (EPA) attended with B.J. LeRoy (WDNR) to review Site conditions and interview PRP representatives and O&M staff from the Town and City of Ripon, the two main PRPs. During the inspection, the group walked around the Site, inspected the cover, viewed gas extraction and groundwater wells, and inspected the gas extraction outbuilding. The findings are documented in an EPA Site Inspection Form, completed by B.J. LeRoy, located in Appendix F. A subsequent FYR inspection was not scheduled due to health concerns related to the pandemic. Conducting a Site inspection is included as a recommendation in this FYR.

Overall, the inspection findings indicate that the landfill is working as intended, requirements in the decision documents are being followed, and Site control measures remain protective. O&M work continues, and the PRP group reports findings and changes on a quarterly basis to WDNR and EPA. The

PRP group is actively engaged in monitoring and operating the Site and making multiple adjustments throughout the year depending on Site monitoring results.

Following placement of the new drainage swale described earlier in the Systems Operations/Operation & Maintenance Section of the FYR, B.J. LeRoy completed an additional drive by inspection on October 22, 2020. The Site fence was intact, and the gate was locked. There was no evidence of trespassing observed during the drive-by inspection. The PRP group representative (Jeff Tracy) indicated that no other Site controls have been changed since the comprehensive 2019 Site inspection.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Yes. Review of Site documents, Applicable or Relevant and Appropriate Requirements (ARARs), risk assumptions, Site inspections and interviews with Site personnel indicate that the remedy is functioning as intended by the ROD. Subsequent additions to the remedy, including an active gas extraction system completed in 2006, extension of City water to some affected residences completed in 2004 and 2015, and implementation of ICs to restrict use of groundwater, will be formally added to the remedy via issuance of another decision document.

The current source control measures such as a landfill cover and gas extraction system prevent exposure to waste and are reducing the migration of contaminants to groundwater through gas extraction. The landfill cover and other Site control measures are needed indefinitely to prevent direct contact with waste materials. Site access to the landfill area is restricted with fencing and signage. Ongoing O&M activities ensure that the landfill cover remains in good repair and that the gas extraction system works efficiently and effectively.

Ongoing groundwater monitoring provides data to track the concentrations of contaminants and plume stability. Groundwater quality has improved over the past 25 years and continues to improve, although possibly at a slower rate. Manganese is the only inorganic analyte that is consistently detected in Site monitoring wells at concentrations above the secondary ES (0.05 mg/L). However, it is a metal that occurs naturally in groundwater in the regional sandstone unit and may not be Site-related. Overall, concentrations of VOCs have decreased over time throughout much of the Site plume. Concentrations of TCE and 1,2-DCE are below ESs in Site wells. Vinyl chloride is the only VOC with recent exceedances of its ES and has been the main VOC of concern in Site groundwater over the past five years.

Due to changing flow directions in Layer 4 and the limited number of Site wells to the southeast, it is unclear if future plume migration in this direction is fully characterized. Intermittent pumping of City supply wells located to the southeast makes the area flow regime somewhat unpredictable. Two supply wells (Municipal Well #6 and Municipal Well #9) have historically shown the presence of TCE from an unknown source. Monitoring well MW-3A, which is located between the Site and Municipal Wells #6 #9, is sampled quarterly. No VOCs were detected at MW-3A during this FYR period. The PRP will review the adequacy of the monitoring well network between the Site and the municipal supply wells to the southeast to determine if additional monitoring well(s) are needed to better characterize potential future potential plume migration in this area.

The required ICs have been implemented at the Site to ensure the remedy is protective in preventing exposure. WDNR is working on providing another layer of protection through additional ICs in the form of COs. There are currently no known Site or media uses which are inconsistent with IC or CO objectives. The current IC Plan will be updated to add a description of the COs that will be implemented and to include procedures to ensure long-term stewardship of all ICs.

Preliminary results for natural attenuation parameters show indications that reducing conditions are present in some areas of the subsurface, and groundwater data show that biodegradation is occuring to some extent. The PRP will be submitting a Supplemental MNA Evaluation report. Based on a review of the report, EPA and WDNR will determine if MNA would be an effective remedy for groundwater at the Site. In addition to selecting a final remedy for groundwater and incorporating the three additional actions taken since the ROD was issued, the decision document planned for 2024 will identify COCs for the Site and incorporate emerging contaminant (1,4-dioxane and/or PFAS) standards, if appropriate.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

No. Other than the identification of several emerging contaminants since the ROD was issued, the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) on which the ROD was based are still valid. There have been no changes to toxicity data used to derive statewide groundwater quality standards or to cleanup levels.

The two emerging contaminants that may be present in groundwater at the Site are 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS). 1,4-dioxane can be associated with some chlorinated solvents. PFAS are a class of man-made chemicals used by a variety of industries that are not found naturally in the environment. Landfills can be a source of PFAS if waste containing these substances was deposited in the landfill. The presence of chlorinated solvents in groundwater affected by the landfill waste means that it is possible that 1,4-dioxane is also present in the waste and may be found in groundwater. Records regarding the exact types of waste disposed of in the landfill have not been identified yet, so whether the landfill waste may be a source of PFAS is currently unknown. Therefore, this FYR recommends that the PRP group prepare an evaluation of the potential for PFAS and 1,4-dioxane within the waste mass by evaluating historical information and records regarding past waste management practices. Based on WDNR's and EPA's review of the information, groundwater sampling for PFAS and/or 1,4-dioxane may be required.

There have been no changes in the physical conditions or use of the Site that would affect the protectiveness of the remedy. The potential for vapor intrusion has been evaluated and was determined to be highly unlikely. No future land uses are planned or anticipated that would affect the protectiveness of the remedy.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. No other information exists that requires additional analysis regarding the remedy effectiveness. There was no information generated during this FYR or other information about natural disasters or vulnerabilities related to the possible impacts of climate change that calls into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None.

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1/2/Sitewide	**Issue Category: Remedy Performance**			
	Issue: WDNR and EPA have not issued a decision document to incorporate the active gas extraction system, the municipal water connections, and the need and requirements for ICs related to groundwater into the Site remedy, and the ROD did not identify Site COCs.			
	Recommendation: WDNR and EPA will issue a decision document to identify Site COCs and to incorporate these additional remedial actions into the Site remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	3/31/2024

OU(s): 2	**Issue Category: Remedy Performance**			
	Issue: The effectiveness of MNA as a potential remedy for groundwater contamination has not been fully demonstrated.			
	Recommendation: The PRPs will continue monitoring to evaluate natural attenuation in groundwater and will submit a Supplemental MNA Evaluation. This evaluation will supplement the analyses of remedial options for groundwater presented in the 2012 FFS.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2022

OU(s): 1/2/ Sitewide	**Issue Category: Institutional Controls**
	Issue: COs for the landfill Property and for off-Property parcels where groundwater results show exceedances are not in place.

	Recommendation: WDNR will implement COs for the landfill Property and off-Property parcels where exceedances of groundwater standards are present to comply with State requirements for ensuring protectiveness.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	3/31/2022

OU(s): 1/2/ Sitewide	**Issue Category: Monitoring**			
	Issue: PFAS and/or 1,4-dioxane may be present in groundwater at the Site as these emerging contaminants have been found at other landfills with VOC contamination.			
	Recommendation: The PRP will evaluate historical information and records regarding past waste management practices and the potential for past disposal of PFAS and 1,4-dioxane and will submit a summary of its findings. Groundwater sampling for PFAS and/or 1,4-dioxane will be conducted, if required.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	3/31/2022

OU(s): 2	**Issue Category: Monitoring**			
	Issue: The groundwater monitoring well network may not adequately monitor the possible migration of contaminated groundwater to the southeast when municipal supply wells are operating.			
	Recommendation: Review adequacy of monitoring well network between the Site and the municipal supply wells to the southeast to determine if additional monitoring well(s) are needed to better characterize potential plume migration in this area.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	3/31/2023

OU(s): 1/2/Sitewide	**Issue Category: Remedy Performance**
	Issue: IC Plan was last updated in 2011.
	Recommendation: The PRP will update the IC Plan to include the COs that will be implemented and to include procedures to ensure long-term stewardship of all ICs.

Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	EPA/State	9/30/2022

OTHER FINDINGS

In addition, the following are recommendations that were identified during the FYR, but do not affect current nor future protectiveness:

- Air emission concentrations are similar to those in previous years, but the results are submitted in a format which does not facilitate comparison with current emission standards. The PRP will convert air emissions results from this FYR period into units that can be easily compared to current standards, will add a column to the results table listing the current standard, and will resubmit a summary of results.
- Conduct a formal FYR Site inspection.

VII. PROTECTIVENESS STATEMENT

OU1 Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy for OU1 at the Ripon City Landfill site currently protects human health and the environment because the remedy is functioning as intended and the landfill cap has been maintained. Immediate human health threats have been addressed, and there are no exposures to landfill waste or contaminants of concern. The landfill cap and fencing around the landfill prevents direct exposure to waste and minimize infiltration to the waste mass. An active gas extraction system installed in 2006 is operating as planned. ICs are in place and functioning as designed. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness: • WDNR and EPA will issue a decision document to identify Site COCs and to incorporate previously completed additional remedial actions, including the installation of an active gas extraction system, into the Site remedy. • WDNR will implement COs for the landfill Property and off-Property parcels where exceedances of groundwater standards are present to comply with State requirements for ensuring protectiveness. • The PRP will evaluate historical information and records regarding past waste management practices and the potential for past disposal of PFAS and 1,4-dioxane and will submit a summary of its findings. Groundwater sampling for PFAS and/or 1,4-dioxane will be conducted, if required. • The PRP will update the IC Plan to include the COs that will be implemented and to include procedures to ensure long-term stewardship of all ICs.

OU2 Protectiveness Statement

Protectiveness Determination:
Short-term Protective

Protectiveness Statement:
The remedy for OU2 at the Ripon City Landfill site currently protects human health and the environment because groundwater monitoring results show that exposure pathways that could result in unacceptable risks are currently under control and nearby residences have been connected to the municipal water supply. Long-term monitoring data on contaminant levels in groundwater shows that most contaminant levels have decreased over time. Vinyl chloride has been the only contaminant with exceedances of the primary ES and has been the main contaminant of concern in groundwater over this FYR period. ICs are in place and functioning as designed.

However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- WDNR and EPA will issue a decision document to select a final groundwater remedy, identify Site COCs, and incorporate previously completed additional remedial actions, such as groundwater ICs and connections to municipal water supply, into the Site remedy.
- The PRPs will continue monitoring to evaluate natural attenuation in groundwater and will submit a Supplemental MNA Evaluation. This evaluation will supplement the analyses of remedial options for groundwater presented in the 2012 FFS.
- WDNR will implement COs for the landfill Property and off-Property parcels where exceedances of groundwater standards are present to comply with State requirements for ensuring protectiveness.
- The PRP will evaluate historical information and records regarding past waste management practices and the potential for past disposal of PFAS and 1,4-dioxane and will submit a summary of its findings. Groundwater sampling for PFAS and/or 1,4-dioxane will be conducted, if required.
- The PRP will review the adequacy of monitoring well network between the Site and the municipal supply wells to the southeast, and WDNR and EPA will review their findings to determine if additional monitoring well(s) are needed to better characterize potential plume migration in this area.
- The PRP will update the IC Plan to include the COs that will be implemented and to include procedures to ensure long-term stewardship of all ICs.

Sitewide Protectiveness Statement

Protectiveness Determination:
Short-term Protective

Protectiveness Statement:
The remedy at the Ripon City Landfill site currently protects human health and the environment because the remedy is functioning as intended. Immediate human health threats have been addressed, and there are no exposures to landfill waste or contaminants of concern. Groundwater and landfill gas monitoring

results and the connection of nearby residences to the municipal water supply show that exposure pathways that could result in unacceptable risks are currently under control. ICs are in place and functioning as designed.

However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- WDNR and EPA will issue a decision document to select a final groundwater remedy, identify Site COCs, and incorporate previously completed additional remedial actions, such as the active gas collection system, groundwater ICs, and connections to municipal water supply, into the Site remedy.
- The PRPs will continue monitoring to evaluate natural attenuation in groundwater and will submit a Supplemental MNA Evaluation. This evaluation will supplement the analyses of remedial options for groundwater presented in the 2012 FFS.
- WDNR will implement COs for the landfill Property and off-Property parcels where exceedances of groundwater standards are present to comply with State requirements for ensuring protectiveness.
- The PRP will evaluate historical information and records regarding past waste management practices and the potential for past disposal of PFAS and 1,4-dioxane and will submit a summary of its findings. Groundwater sampling for PFAS and/or 1,4-dioxane will be conducted, if required.
- The PRP will review the adequacy of monitoring well network between the Site and the municipal supply wells to the southeast, and WDNR and EPA will review their findings to determine if additional monitoring well(s) are needed to better characterize potential plume migration in this area.
- The PRP will update the IC Plan to include the COs that will be implemented and to include procedures to ensure long-term stewardship of all ICs.

VIII. NEXT REVIEW

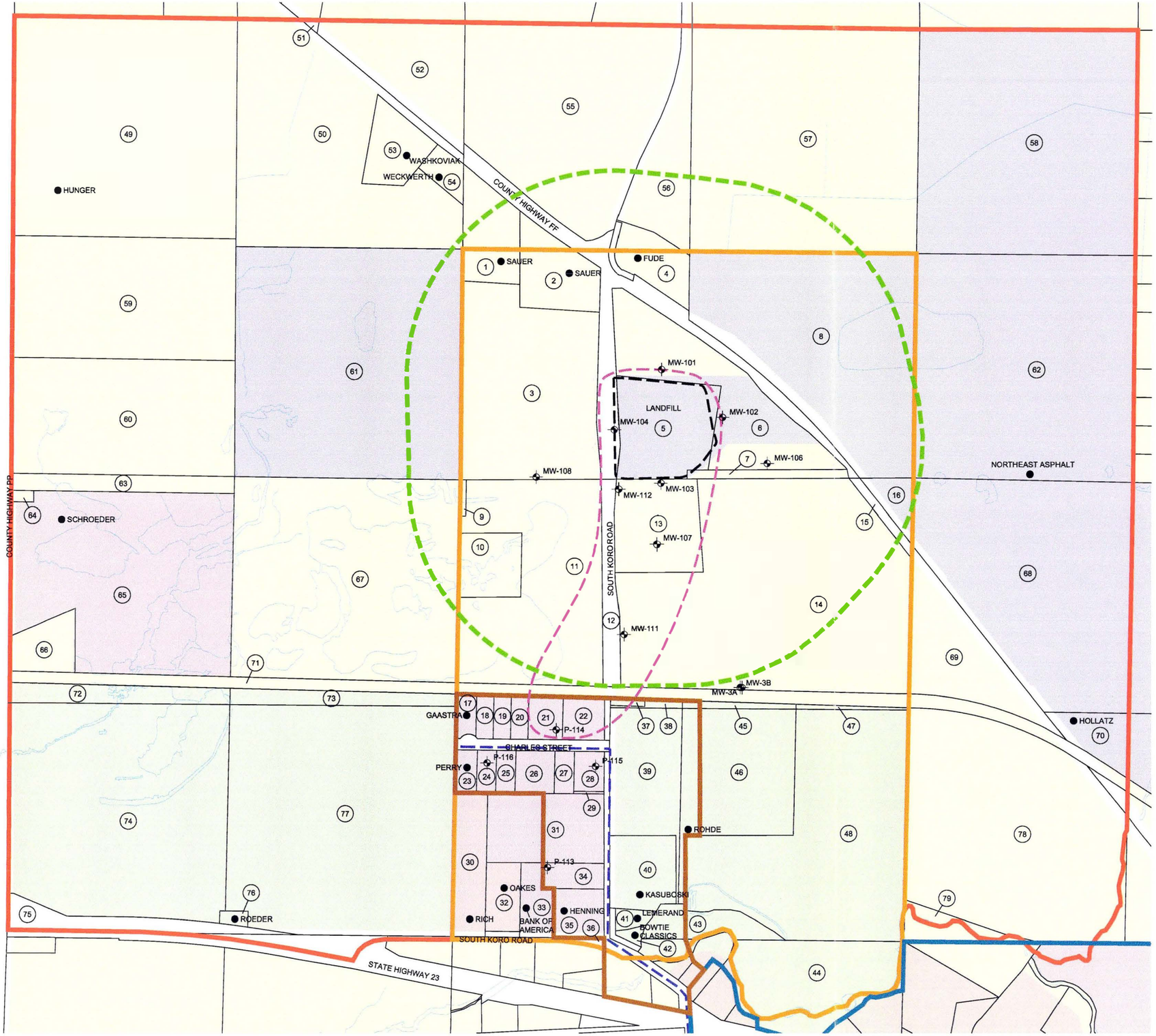
The next FYR report for the Ripon City Landfill Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCES

REFERENCES – RIPON CITY (FF/NN) LANDFILL

1. CERCLA Section 121, 1980.
2. National Contingency Plan, (40 CFR Section 300.430(f)(4)(ii)).
3. Fourth Five Year Report, Ripon City Landfill, EPA, 2016.
4. Public Health Announcement, Wisconsin Division of Health, March 30, 1995.
5. RI/FS, Hydro-Search, 1994.
6. Record of Decision, Ripon City Landfill, WDNR, 1996.
7. Remedial Action Plan Construction Documentation, HSI Geotrans, 1997.
8. Focused Feasibility Study, TetraTech, 2012.
9. Gas Extraction System Installation Documentation Report, Geotrans, 2006.
10. Municipal Water Extension, Geotrans, 2002.
11. Institutional Control Plan, TetraTech, 2011.
12. Wisconsin Administrative Chapter NR 500.
13. Wisconsin Administrative Chapter NR 812.
14. Wisconsin Administrative Chapter NR 140.
15. Town of Ripon Ordinance, 2019.
16. Second Quarter Report, TetraTech, 2016.
17. Third Quarter Report, TetraTech, 2016.
18. Fourth Quarter Report, TetraTech, 2016.
19. First Quarter Report, TetraTech, 2017.
20. Second Quarter Report, TetraTech, 2017.
21. Third Quarter Report, TetraTech, 2017.
22. First Quarter Report, TetraTech, 2018.
23. Second Quarter Report, TetraTech, 2018.
24. Third Quarter Report, TetraTech, 2018.
25. Fourth Quarter Report, TetraTech, 2018.
26. Second Quarter Report, TRC, 2019.
27. Third Quarter Report, TRC, 2019.
28. Fourth Quarter Report, TRC, 2019.
29. First Quarter Report, TRC, 2020.
30. Second Quarter Report, TRC, 2020.
31. Third Quarter Report, TRC, 2020.
32. Fourth Quarter Report, TRC, 2020.
33. Vapor Intrusion Assessment, TRC, 2020.

APPENDIX B – SPECIAL WELL AREA LOCATION



EXPLANATION

- WDNR WELL ADVISORY AREA - OUTER
- WDNR WELL ADVISORY AREA - INNER
- CLOSED LANDFILL
- 1200-FOOT LANDFILL BUFFER
- GROUNDWATER VOC PLUME
- MUNICIPAL WATER LINE
- AREA SERVED BY MUNICIPAL WATER WITHIN CITY LIMITS
- AREA WITH MUNICIPAL WATER AVAILABLE OUTSIDE CITY LIMITS
- MW-101 — MONITORING WELL
- HUNGER — PRIVATE WATER SUPPLY WELL
- (31) — PARCEL IDENTIFICATION NUMBER

ZONING:

- EXCLUSIVE AGRICULTURAL
- AGRICULTURAL TRANSITIONAL
- RESIDENTIAL
- BUSINESS
- INDUSTRIAL

N

0 600 1200

SCALE IN FEET

TITLE:	FF/NN LANDFILL INSTITUTIONAL CONTROLS
LOCATION:	RIPON, WISCONSIN

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	3
PROJECT	117-2202040	
DATE	2/24/11	

S:\CAD\Ripon\Institutional Controls Study\All Figures.dwg

APPENDIX C – PUBLIC NOTICE

OFFICIAL NOTICE

PUBLIC NOTICE FOR DNR and EPA FIVE-YEAR REVIEW OF THE RIPON FF/NN LANDFILL SUPERFUND SITE

The Wisconsin Department of Natural Resources (DNR) is submitting public notification for the beginning of the DNR and the U. S. Environmental Protection Agency (EPA) five-year review of the Ripon City FF/NN Landfill Superfund Site, located at N8901 South Koro Road in the town of Ripon.

The federal Superfund law requires a review at least every five years at sites where a cleanup is on-going. The DNR and EPA conduct this review to make sure the cleanup still protects people and the environment. This is the fifth such review since construction work was completed in 1996.

The Ripon City FF/NN Landfill site originally operated as a gravel pit, then became a landfill site in 1967. The City of Ripon operated the landfill until 1983, accepting municipal, commercial and industrial solid wastes. Groundwater sampling in 1984 revealed volatile organic compounds in several nearby private wells.

In 1992, several potentially responsible parties (PRPs) entered into a contract with the DNR to complete an investigation and develop a plan to address the contamination. In 1994, the DNR issued a Record of Decision requiring the PRPs to restrict access to the waste area and limit the release of contamination to the environment.

By 1996, the PRP group installed a landfill cover, gas venting system and deed restrictions on affected properties and began long-term monitoring of the groundwater, landfill gas and leachate. In 2006, the PRPs installed a gas collection system, and in 2002 and 2015 they arranged to connect additional nearby residences to the municipal water supply.

Today, the landfill exists as a grass-covered field surrounded by fence and woods. Gas extraction and groundwater wells evaluate contaminant migration through routine monitoring. Federal, state and county ordinances restrict groundwater use in the immediate area, which ultimately provides public protection from contamination that remains in groundwater.

The DNR invites interested parties to provide information that might be important in this site review. To submit comments, contact BJ LeRoy, DNR Hydrogeologist:

- Mail: 2300 N. Dr. Martin Luther King, Jr. Drive, Milwaukee, WI 53212
- Phone: 920-889-0151
- E-mail: BJ.LeRoy@wisconsin.gov

Or contact Mary Tierney, EPA Remedial Project Manager:

- Mail: 77 W. Jackson Blvd., Chicago, IL 60604
- Phone: 312-886-4785
- E-mail: tierney.mary@epa.gov

The information gathered will be considered during the review process if received by May 31, 2021. The five-year review report will be completed in July 2021.

To learn about the Ripon FF/NN Landfill site or see previous five-year reviews, visit https://dnr.wi.gov/botw/SetUpBasicSearchForm.do and enter 02-20-000915 into the "BRRTS No." field on the search form. The upcoming July 2021 report can also be found here when completed.

Additional information can be found on the EPA Ripon Landfill web page at http://www.epa.gov/superfund/ripon-city-landfill.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
For the Secretary

Christine Haag Date: March 31, 2021
Director, Remediation and Redevelopment Program

WNAXLP

APPENDIX D – LANDFILL MONITORING DATA

SWALE REPAIR - 2020

Photographic Log

Client Name:	Site Location:	Project No.:
FF/NN Landfill Group	FF/NN Landfill, Ripon WI	378957

Photo No.	Date
3	9/23/2020

Description:
Excavation near drainage pipe outlet to reduce ponding.

Photo taken facing east.

Photo No.	Date
4	9/23/2020

Description:
Excavation near drainage pipe outlet to reduce ponding.

Photo taken facing west.

Photographic Log

Client Name:	Site Location:	Project No.:
FF/NN Landfill Group	FF/NN Landfill, Ripon WI	378957

Photo No.	Date
5	9/23/2020

Description:
Drainage swale with topsoil and erosion mat installed.

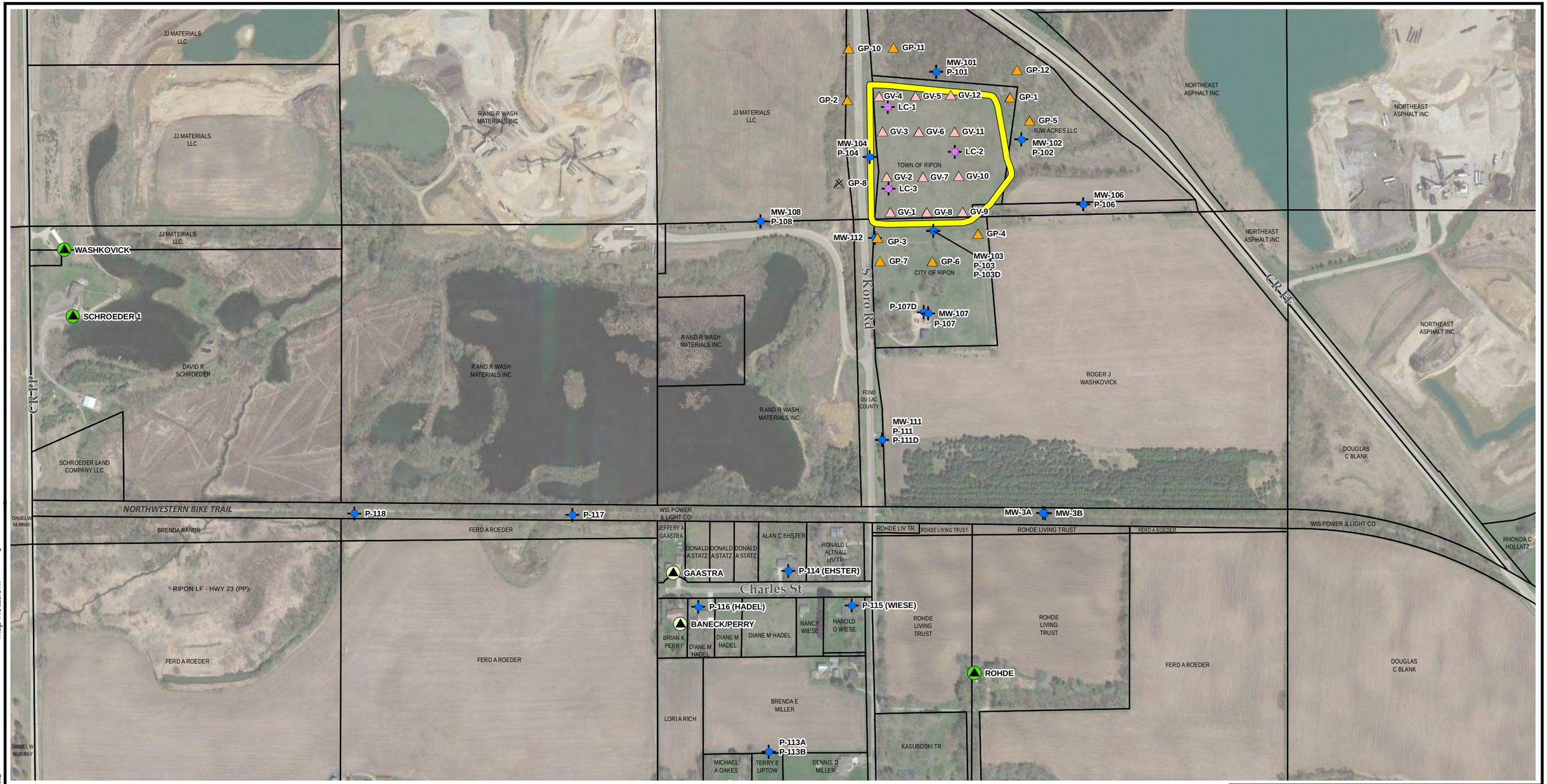
Photo taken facing east.

Photo No.	Date
6	11/11/2020

Description:
Drainage swale after vegetative growth has started.

Photo taken facing east.

BI-WEEKLY GAS PROBE MONITORING



LEGEND

- GAS PROBE
- GAS PROBE (LOST)
- GAS VENT
- LEACHATE HEAD WELL
- MONTIORING WELL, PIEZOMETER LOCATION
- PRIVATE WELL USED FOR POTABLE PURPOSES
- PRIVATE WELL NOT USED FOR POTABLE PURPOSES
- RIPON FF/NN LANDFILL SITE

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO., (4/21/2017).

0 200 400 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
THIRD QUARTER 2019 REPORTING

TITLE:
SITE LAYOUT MAP

DRAWN BY:	A. ADAIR	PROJ. NO.:	327275
CHECKED BY:	M. STOLLENWERK		
APPROVED BY:	J. WEDEKIND		**FIGURE 2**
DATE:	DECEMBER 2019		

TRC
150 North Patrick Blvd., Suite 180
Brookfield, WI 53045
Phone: 262.879.1212
www.trcsolutions.com

FILE NO.: Fig2_327275_Q32_SLP.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0
Plot Date: 12/17/2019, 09:26:56 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Ripon\Fig2_327275_Q32_SLP.mxd

Table 4: Landfill Gas Field Parameter Monitoring Results
FF/NN Landfill
Ripon, Wisconsin,
First Quarter 2020

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
Background	13:09	1/10/2020	0.0	0.0	20.9	79.1	
	13:05	1/24/2020	0.0	0.0	20.9	79.1	
	13:02	2/7/2020	0.0	0.0	20.9	79.1	
	9:22	2/17/2020	0.0	0.0	20.7	79.3	
	10:31	2/26/2020	0.0	0.0	20.7	79.3	
	13:26	3/6/2020	0.0	0.0	20.9	79.1	
LC-1	13:15	1/10/2020	6.0	28.0	0.7	65.3	
	13:12	1/24/2020	5.0	26.8	1.0	67.2	
	13:08	2/7/2020	5.5	27.4	0.5	66.6	
	11:29	2/17/2020	16.9	22.7	0.1	60.3	
	11:46	2/26/2020	4.1	21.2	0.6	74.1	
	13:32	3/6/2020	3.9	26.0	1.0	69.1	
LC-2	13:29	1/10/2020	32.0	36.2	3.1	28.7	
	13:24	1/24/2020	32.0	38.6	1.6	27.8	
	13:20	2/7/2020	30.5	38.4	1.1	30.0	
	11:41	2/17/2020	33.9	28.4	0.9	36.8	
	11:52	2/26/2020	29.6	26.8	1.1	42.5	
	13:44	3/6/2020	28.5	33.2	2.8	35.5	
LC-3	13:25	1/10/2020	4.2	5.6	16.5	73.7	
	13:21	1/24/2020	14.0	27.0	2.3	56.7	
	13:17	2/7/2020	11.5	23.4	4.4	60.7	
	11:25	2/17/2020	22.4	22.3	1.3	54.0	
	11:42	2/26/2020	13.5	20.4	2.3	63.8	
	13:40	3/6/2020	9.0	18.6	7.1	65.3	
GV-4	13:20	1/10/2020	2.9	11.4	11.2	74.6	Ph
	13:19	1/10/2020	3.1	11.6	11.0	74.3	Pw
	13:15	1/24/2020	2.6	10.4	11.5	75.6	Ph
	13:14	1/24/2020	2.6	10.8	11.3	75.3	Pw
	13:11	2/7/2020	1.7	10.2	11.2	77.0	Ph
	13:12	2/7/2020	1.7	10.2	11.2	77.0	Pw
	11:33	2/17/2020	2.3	11.3	5.9	80.5	Pw
	11:50	2/26/2020	1.7	8.7	12.1	77.5	Pw
	13:35	3/6/2020	0.4	7.2	13.2	79.3	Ph
	13:34	3/6/2020	0.4	7.2	13.1	79.4	Pw
GV-6	13:23	1/10/2020	10.0	20.2	6.6	63.2	
	13:18	1/24/2020	9.0	19.2	7.0	64.8	
	13:14	2/7/2020	8.5	17.6	7.9	66.0	
	11:39	2/17/2020	8.6	16.3	4.1	71.0	
	11:53	2/26/2020	9.3	14.8	7.6	68.3	
	13:38	3/6/2020	1.1	10.0	11.1	77.9	
GP-1	13:10	1/10/2020	0.0	0.0	20.9	79.1	
	14:11	1/10/2020	0.0	0.2	20.9	78.9	
	13:06	1/24/2020	0.0	0.0	20.9	79.1	
	14:06	1/24/2020	0.0	0.2	20.9	78.9	
	13:03	2/7/2020	0.0	0.0	20.9	79.1	
	14:06	2/7/2020	0.1	0.2	20.9	78.9	
	9:31	2/17/2020	0.0	2.1	14.8	83.1	
	10:45	2/26/2020	0.0	2.3	14.2	83.5	
	13:27	3/6/2020	0.0	0.6	19.4	80.0	
	14:27	3/6/2020	0.0	0.8	18.9	80.3	
GP-2	14:18	1/10/2020	0.0	0.0	0.6	99.4	
	-	1/24/2020	-	-	-	-	Connection Frozen Shut
	-	2/7/2020	-	-	-	-	Connection Frozen Shut
	10:37	2/17/2020	0.0	7.5	13.4	79.1	Unthawed sample port
	11:14	2/26/2020	0.0	0.0	20.8	79.2	
	14:34	3/6/2020	0.0	0.0	20.9	79.1	

Table 4: Landfill Gas Field Parameter Monitoring Results
FF/NN Landfill
Ripon, Wisconsin,
First Quarter 2020

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
GP-3	11:07	2/17/2020	0.0	4.9	14.6	80.5	
	11:27	2/26/2020	0.0	0.2	20.7	79.1	
GP-4	11:14	2/17/2020	0.0	1.5	19.2	79.3	
	11:33	2/26/2020	0.0	0.7	19.9	79.4	
GP-5	9:46	2/17/2020	0.0	2.5	18.8	78.7	
	10:48	2/26/2020	0.0	2.5	18.8	78.7	
GP-6	10:51	2/17/2020	0.0	2.4	17.9	79.7	
	12:10	2/26/2020	0.0	0.9	20.2	78.9	
GP-7	10:46	2/17/2020	0.0	4.1	15.4	80.5	
	12:06	2/26/2020	0.0	0.2	20.7	79.1	
GP-10	10:04	2/17/2020	0.0	3.4	18.0	78.6	
	11:07	2/26/2020	0.0	3.4	17.9	78.7	
GP-11	10:12	2/17/2020	0.0	2.7	18.5	78.8	
	10:58	2/26/2020	0.0	1.8	19.1	79.1	
GP-12	9:52	2/17/2020	0.0	5.2	16.0	78.8	
	10:53	2/26/2020	0.0	2.4	18.6	79.0	
Exhaust	13:11	1/10/2020	4.6	9.6	13.0	77.2	
	13:08	1/24/2020	4.1	9.0	13.3	77.5	
	13:04	2/7/2020	2.3	6.2	15.3	78.4	
	9:27	2/17/2020	3.8	9.6	9.1	81.1	
	10:38	2/26/2020	3.1	7.2	14.4	78.2	
	13:28	3/6/2020	1.6	6.0	14.9	79.0	

Notes:

-- = Data not recorded

LEL = Lower Explosive Limit

CH_4 = Methane

CO_2 = Carbon Dioxide

O_2 = Oxygen

N = Nitrogen

% = Percent

Ph = gas reading collected from the extraction header

Pw = gas reading collected from the extraction well

Created By: A. Sobbe 3/9/2020

Updated/Checked By: B. Wachholz 3/31/2020

Checked By A. Stehn 3/31/2020

Checked By M. Stollenwerk 4/22/2020

Table 7: Landfill Gas Field Parameter Monitoring Results
FF/NN Landfill
Ripon, Wisconsin,
Second Quarter 2020

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
Background	13:33	4/1/2020	0.0	0.0	20.9	79.1	
	14:12	4/17/2020	0.0	0.0	20.9	79.1	
	10:20	4/28/2020	0	0.1	20.7	79.2	
	4/29/2020						See Footnote 1
	11:13	5/1/2020	0.0	0.0	20.9	79.1	
	7:50	5/5/2020	0.0	0.0	20.9	79.1	
	13:20	5/14/2020	0.0	0.0	20.9	79.1	
	10:23	6/1/2020	0.0	0.0	20.9	79.1	
	13:20	6/10/2020	0.0	0.0	20.9	79.1	
	13:36	6/25/2020	0.0	0.0	20.9	79.1	
LC-1	13:42	4/1/2020	9.5	28.8	0.2	61.5	
	14:27	4/17/2020	8.5	28.6	0.3	62.6	
	10:07	4/28/2020	7.8	21.2	0.0	71.0	System shutdown after testing and extraction header replaced.
	4/29/2020						System restarted, see Footnote 1
	11:36	5/1/2020	3.7	25.8	1.0	69.5	
	8:13	5/5/2020	2.7	18.4	1.9	77.1	
	13:45	5/14/2020	3.2	16.8	2.6	77.4	
	10:39	6/1/2020	2.7	15.6	4.6	77.2	
	13:37	6/10/2020	3.1	15.0	4.0	77.9	
	13:45	6/25/2020	2.1	15.0	5.3	77.6	
LC-2	13:49	4/1/2020	35.5	36.6	0.8	27.1	
	14:34	4/17/2020	37.5	35.4	1.7	25.4	
	10:15	4/28/2020	34.6	24.1	2.2	39.1	System shutdown after testing and extraction header replaced.
	4/29/2020						System restarted, see Footnote 1
	11:45	5/1/2020	39.5	35.0	2.0	23.5	
	8:22	5/5/2020	32.0	24.4	1.9	41.7	
	13:55	5/14/2020	27.0	23.6	2.0	47.4	
	10:50	6/1/2020	23.0	23.6	1.3	52.1	
	13:45	6/10/2020	23.0	23.0	1.0	53.0	
	14:04	6/25/2020	21.5	23.0	1.7	53.8	
LC-3	13:47	4/1/2020	18.0	23.2	5.7	53.1	
	14:31	4/17/2020	22.5	28.2	3.9	45.4	
	10:02	4/28/2020	24.8	23.8	1.3	50.1	System shutdown after testing and extraction header replaced.
	4/29/2020						System restarted, see Footnote 1
	11:42	5/1/2020	19.5	30.4	1.9	48.2	
	8:20	5/5/2020	13.0	20.2	2.2	64.6	
	13:52	5/14/2020	10.5	19.0	2.6	67.9	
	10:47	6/1/2020	8.5	18.2	2.3	71.0	
	13:43	6/10/2020	9.5	17.6	2.2	70.7	
	14:00	6/25/2020	8.5	18.0	2.8	70.7	
GV-4	13:40	4/1/2020	3.0	12.2	9.4	75.5	Ph
	13:39	4/1/2020	2.9	12.2	9.5	75.5	Pw
	14:20	4/17/2020	4.6	14.0	8.4	73.0	Ph
	14:19	4/17/2020	4.6	14.0	8.4	73.0	Pw
	10:09	4/28/2020	3.3	10.9	9.1	76.7	System shutdown after testing and extraction header replaced.
	4/29/2020						System restarted, see Footnote 1
	11:25	5/1/2020	1.5	8.0	14.2	76.4	
	8:08	5/5/2020	0.9	5.4	15.1	78.6	
	13:40	5/14/2020	0.8	4.8	15.0	79.5	
	10:37	6/1/2020	0.8	6.4	13.1	79.7	
	13:34	6/10/2020	0.7	6.0	13.0	80.4	
	13:49	6/25/2020	0.7	6.6	13.1	79.7	

Table 7: Landfill Gas Field Parameter Monitoring Results
FF/NN Landfill
Ripon, Wisconsin,
Second Quarter 2020

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
GV-6	13:44	4/1/2020	10.5	19.0	6.3	64.2	
	14:29	4/17/2020	14.0	21.8	5.4	58.8	
	10:13	4/28/2020	12.6	15.6	6.2	65.6	System shutdown after testing and extraction header replaced.
		4/29/2020					System restarted, see Footnote 1
	11:38	5/1/2020	8.5	18.8	6.6	66.1	
	8:14	5/5/2020	6.0	13.0	7.6	73.4	
	13:47	5/14/2020	5.0	12.0	7.5	75.5	
	10:43	6/1/2020	3.6	9.0	10.6	76.9	
	13:39	6/10/2020	3.1	8.4	10.7	77.9	
	13:58	6/25/2020	3.0	9.0	10.8	77.2	
GP-1	13:34	4/1/2020	0.0	0.0	20.9	79.1	
	14:37	4/1/2020	0.0	0.0	20.9	79.1	
	14:13	4/17/2020	0.0	0.0	20.9	79.1	
	15:13	4/17/2020	0.0	0.0	20.9	79.1	
	9:12	4/28/2020	0.0	3.3	13.1	83.6	System shutdown after testing and extraction header replaced.
		4/29/2020					System restarted, see Footnote 1
	11:15	5/1/2020	0.0	0.8	19.2	80.0	
	12:17	5/1/2020	0.0	0.8	18.8	80.4	
	7:53	5/5/2020	0.0	3.2	13.4	83.4	
	8:57	5/5/2020	0.0	3.4	13.3	83.3	
	13:22	5/14/2020	0.0	4.4	11.0	84.6	
	14:26	5/14/2020	0.0	4.8	10.3	84.9	
	10:24	6/1/2020	0.0	0.2	20.9	78.9	
	11:27	6/1/2020	0.0	0.4	20.9	78.7	
	13:21	6/10/2020	0.0	7.4	4.7	87.9	
	14:23	6/10/2020	0.0	7.2	4.9	87.9	
	13:38	6/25/2020	0.0	8.4	5.5	86.1	
	14:40	6/25/2020	0.0	8.2	5.2	86.6	
GP-2	14:41	4/1/2020	0.0	3.8	16.6	79.6	
	14:24	4/17/2020	0.0	6.6	14.0	79.4	
	8:26	4/28/2020	0.0	0.1	20.7	79.2	System shutdown after testing and extraction header replaced.
		4/29/2020					System restarted, see Footnote 1
	11:28	5/1/2020	0.0	1.4	19.5	79.1	
	8:05	5/5/2020	0.0	0.0	20.9	79.1	
	13:33	5/14/2020	0.0	0.0	20.9	79.1	
	10:32	6/1/2020	0.0	1.8	18.2	80.0	
	13:29	6/10/2020	0.0	0.4	20.6	79.0	
	13:45	6/25/2020	0.0	1.2	18.8	80.0	
GP-3	8:41	4/28/2020	0.0	0.1	20.5	79.4	
GP-4	8:57	4/28/2020	0.0	1.5	19.2	79.3	
GP-5	9:15	4/28/2020	0.0	2.4	17.0	80.6	
GP-6	8:50	4/28/2020	0.0	1.5	18.7	79.8	
GP-7	8:47	4/28/2020	0.0	0.1	20.6	79.3	
GP-10	8:30	4/28/2020	0.0	2.7	18.8	78.5	
GP-11	8:19	4/28/2020	0.0	2.2	18.6	79.2	
GP-12	9:19	4/28/2020	0.0	2.1	18.0	79.9	

Table 7: Landfill Gas Field Parameter Monitoring Results
FF/NN Landfill
Ripon, Wisconsin,
Second Quarter 2020

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
Exhaust	13:35	4/1/2020	1.8	3.8	17.4	78.7	
	14:15	4/17/2020	2.5	4.2	17.0	78.7	
	10:18	4/28/2020	1.5	3.0	17.7	79.2	System shutdown after testing and extraction header replaced.
	4/29/2020						System restarted, see Footnote 1
	11:17	5/1/2020	5.5	13.0	10.7	70.8	
	7:56	5/5/2020	4.0	8.6	11.8	75.6	
	13:24	5/14/2020	3.4	8.2	11.7	76.7	
	10:26	6/1/2020	2.7	7.8	11.9	77.7	
	13:23	6/10/2020	2.5	7.6	11.8	78.1	
	13:39	6/25/2020	2.5	8.2	11.9	77.5	

Notes:

Updated By A. Stehn 10/29/2020

-- = Data not recorded

Checked by A. Sobbe 10/30/2020

LEL = Lower Explosive Limit

CH_4 = Methane

CO_2 = Carbon Dioxide

O_2 = Oxygen

N = Nitrogen

% = Percent

Ph = gas reading collected from the extraction header

Pw = gas reading collected from the extraction well

Footnotes:

(1) The GES was restarted on April 29, 2020, following system repairs and modifications, restart data is include in Appendix A of the 2020 Second Quarter Report

Table 4: Landfill Gas Field Parameter Monitoring Results
FF/NN Landfill
Ripon, Wisconsin,
Third Quarter 2020

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
Background	13:00	7/9/2020	0.0	0.0	20.9	79.1	
	15:03	7/24/2020	0.0	0.0	21.0	79.0	
	13:24	8/7/2020	0.0	0.0	20.9	79.1	
	11:27	8/10/2020	0.0	0.0	20.9	79.1	
	14:01	8/19/2020	0.0	0.0	20.9	79.1	
	14:02	8/21/2020	0.0	0.0	20.9	79.1	
	13:38	9/11/2020	0.0	0.0	20.9	79.1	
	13:10	9/25/2020	0.0	0.0	20.9	79.1	
LC-1	-	7/9/2020	-	-	-	-	RKI Eagle Instrument stopped working, reading could not be collected.
	15:33	7/14/2020	2.2	16.0	4.9	76.9	
	15:27	7/24/2020	3.2	18.6	1.5	76.7	
	13:40	8/7/2020	2.3	18.6	5.2	74.0	
	11:51	8/10/2020	2.6	15.0	5.4	77.0	
	14:19	8/19/2020	2.5	15.2	5.6	76.7	
	13:56	9/11/2020	2.5	14.6	6.0	77.0	
	7:54	9/23/2020	3.1	16.7	4.4	75.8	Intake valve added to blower to regulate overall system vacuum.
	--	9/23/2020	3.5	16.8	3.5	76.2	Reading collected after system modification made.
	13:29	9/25/2020	3.4	12.4	6.2	78.0	
LC-2	-	7/9/2020	-	-	-	-	RKI Eagle Instrument stopped working, reading could not be collected.
	15:17	7/14/2020	21.9	23.5	0.8	53.8	
	15:37	7/24/2020	22.1	23.9	0.6	53.4	
	13:48	8/7/2020	19.0	28.0	1.3	51.7	
	11:59	8/10/2020	19.0	23.8	1.4	55.8	
	14:25	8/19/2020	18.5	23.8	1.6	56.1	
	14:03	9/11/2020	19.0	23.4	1.3	56.3	
	7:43	9/23/2020	19.9	23.9	0.9	55.3	Intake valve added to blower to regulate overall system vacuum.
	--	9/23/2020	22.0	24.4	0.5	53.1	Reading collected after system modification made.
	13:41	9/25/2020	19.5	23.2	1.2	56.1	
LC-3	-	7/9/2020	-	-	-	-	RKI Eagle Instrument stopped working, reading could not be collected.
	15:30	7/14/2020	9.8	18.9	2.2	69.1	
	15:34	7/24/2020	11.0	18.8	2.7	67.5	
	13:46	8/7/2020	7.0	20.6	3.3	69.1	
	11:56	8/10/2020	7.0	17.2	3.7	72.1	
	14:23	8/19/2020	6.5	16.8	3.7	73.0	
	14:01	9/11/2020	6.5	16.2	4.0	73.3	
	7:51	9/23/2020	7.9	17.7	3.2	71.2	Intake valve added to blower to regulate overall system vacuum.
	--	9/23/2020	8.1	17.5	3.3	71.1	Reading collected after system modification made.
	13:36	9/25/2020	8.5	16.4	3.7	71.4	
GV-4	-	7/9/2020	-	-	-	-	RKI Eagle Instrument stopped working, reading could not be collected.
	15:41	7/14/2020	0.9	8.0	12.3	78.9	
	15:24	7/24/2020	0.2	7.1	13.6	79.1	
	13:38	8/7/2020	0.1	6.0	14.7	79.2	
	11:48	8/10/2020	0.2	5.4	14.6	79.9	
	14:17	8/19/2020	0.3	6.0	13.8	79.9	
	13:54	9/11/2020	0.2	5.6	14.4	79.8	
	7:57	9/23/2020	0.2	6.3	14.5	79.0	Intake valve added to blower to regulate overall system vacuum.
	--	9/23/2020	0.4	8.2	11.6	79.8	Reading collected after system modification made.
	13:27	9/25/2020	0.8	7.6	10.9	80.8	

Table 4: Landfill Gas Field Parameter Monitoring Results
FF/NN Landfill
Ripon, Wisconsin,
Third Quarter 2020

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
GV-6	-	7/9/2020	-	-	-	-	RKI Eagle Instrument stopped working, reading could not be collected.
	15:25	7/14/2020	2.7	9.9	10.8	76.7	
	15:31	7/24/2020	2.7	10.8	10.1	76.4	
	13:43	8/7/2020	2.2	10.4	11.2	76.3	
	11:53	8/10/2020	2.2	8.8	11.6	77.5	
	14:20	8/19/2020	2.4	8.8	11.4	77.5	
	13:58	9/11/2020	2.7	9.6	10.5	77.2	
	7:46	9/23/2020	2.0	9.8	11.5	76.7	Intake valve added to blower to regulate overall system vacuum.
	--	9/23/2020	2.4	8.5	12.8	76.3	Reading collected after system modification made.
	13:31	9/25/2020	3.1	9.8	9.7	77.4	
GP-1	13:02	7/9/2020	0.0	6.8	12.0	81.2	
	14:19	7/14/2020	0.0	10.1	5.1	84.8	
	15:06	7/24/2020	0.0	9.4	8.0	82.6	
	13:24	8/7/2020	0.5	11.0	5.6	82.9	
	14:25	8/7/2020	0.4	11.0	5.3	83.4	
	11:34	8/10/2020	0.0	10.4	5.3	84.3	
	12:36	8/10/2020	0.0	10.8	5.0	84.2	
	14:03	8/19/2020	0.5	9.2	6.5	83.8	
	15:05	8/19/2020	0.6	12.4	2.4	84.6	
	14:05	8/21/2020	0.1	10.6	7.1	82.2	
	14:39	8/31/2020	0.0	7.6	6.8	85.6	
	13:40	9/11/2020	0.0	7.6	7.8	84.6	
	14:42	9/11/2020	0.0	8.2	7.1	84.7	
	7:39	9/23/2020	0.0	8.7	8.5	82.8	Intake valve added to blower to regulate overall system vacuum.
	--	9/23/2020	0.0	9.3	7.5	83.2	Reading collected after system modification made.
	13:11	9/25/2020	0.0	9	6.6	84.4	
	14:12	9/25/2020	0.0	8.6	6.6	84.8	
GP-2	-	7/9/2020	-	-	-	-	RKI Eagle Instrument stopped working, reading could not be collected.
	14:44	7/14/2020	0.0	0.3	19.8	79.9	
	15:17	7/24/2020	0.0	0.1	20.0	79.9	
	13:35	8/7/2020	0.0	0.0	20.9	79.1	
	11:45	8/10/2020	0.0	0.6	20.3	79.1	
	14:13	8/19/2020	0.0	3.2	16.2	80.6	
	13:50	9/11/2020	0.0	3.6	14.9	81.5	
	8:09	9/23/2020	0.0	0.1	20.9	79.0	Intake valve added to blower to regulate overall system vacuum.
	--	9/23/2020	0.0	2.9	16.3	80.8	Reading collected after system modification made.
	13:23	9/25/2020	0.0	3.0	16.0	81.0	
GP-3	15:02	7/14/2020	0.0	0.1	20.6	79.3	
GP-4	15:05	7/14/2020	0.0	1.5	18.8	79.7	
GP-5	14:23	7/14/2020	0.0	7.1	12.2	80.7	
	11:31	8/10/2020	0.0	6.2	14.8	79.0	
	14:07	8/21/2020	0.0	4.4	17.0	78.6	
	14:41	8/31/2020	0.0	4.8	14.4	80.8	
	14:08	9/11/2020	0.0	7.8	11.8	80.4	
	8:25	9/23/2020	0.0	8.2	12.7	79.1	
GP-6	14:57	7/14/2020	0.0	1.3	18.6	80.1	
GP-7	14:54	7/14/2020	0.0	0.6	19.6	79.8	
GP-10	14:11	7/14/2020	0.0	4.3	12.8	82.9	
	8:06	9/23/2020	0.0	6.2	11.5	82.3	
GP-11	14:39	7/14/2020	0.0	3.1	17.3	79.6	
	8:03	9/23/2020	0.0	2.7	18.9	78.4	
GP-12	14:30	7/14/2020	0.0	1.6	18.3	80.1	
	11:28	8/10/2020	0.0	1.8	19.2	79.0	
	14:02	8/21/2020	0.0	1.8	20.1	78.1	
	14:34	8/31/2020	0.0	1.6	18.8	79.6	
	14:10	9/11/2020	0.0	2.2	18.5	79.3	
	8:29	9/23/2020	0.0	2.3	18.6	79.1	

Table 4: Landfill Gas Field Parameter Monitoring Results
FF/NN Landfill
Ripon, Wisconsin,
Third Quarter 2020

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
Exhaust	13:04	7/9/2020	2.2	8.0	12.0	77.9	
	14:16	7/14/2020	2.3	9.3	11.2	77.3	
	15:11	7/24/2020	3.1	10.9	10.5	75.5	
	13:29	8/7/2020	2.5	10.4	11.4	75.8	
	11:39	8/10/2020	2.4	8.6	11.6	77.4	
	14:07	8/19/2020	2.5	8.8	11.6	77.1	
	13:44	9/11/2020	2.9	9.4	10.9	76.8	
	7:37	9/23/2020	2.4	9.7	11.6	76.3	
	13:16	9/25/2020	1.6	4.2	15.9	78.4	

Notes:

Updated By A. Stehn 10/29/2020

Checked by A. Sobbe 10/30/2020

-- = Data not recorded

LEL = Lower Explosive Limit

CH_4 = Methane

CO_2 = Carbon Dioxide

O_2 = Oxygen

N = Nitrogen

% = Percent

Ph = gas reading collected from the extraction header

Pw = gas reading collected from the extraction well

Table 6: Landfill Gas Field Parameter Monitoring Results - Fourth Quarter 2020
FF/NN Landfill
Ripon, Wisconsin

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
Background	13:47	10/13/2020	0.0	0.0	20.9	79.1	
	10:26	10/28/2020	0.0	0.1	20.8	79.1	
	13:46	11/6/2020	0.0	0.0	20.9	79.1	
	13:20	11/18/2020	0.0	0.0	20.9	79.1	
	13:45	12/9/2020	0.0	0.0	20.9	79.1	
	10:02	12/11/2020	0.0	0.0	20.9	79.1	
	13:46	12/17/2020	0.0	0.0	20.9	79.1	
	14:00	12/18/2020	0.0	0.0	20.9	79.1	
	13:40	12/22/2020	0.0	0.0	20.9	79.1	
LC-1	14:09	10/13/2020	8.0	21.0	0.4	70.6	
	12:16	10/28/2020	10.6	21.8	0.3	67.3	
	14:43	11/6/2020	9.0	21.8	0.8	68.4	
	11:06	11/11/2020	15.2	22.8	0.1	61.9	
	13:40	11/18/2020	22.5	24.4	1.0	52.1	
	14:01	12/9/2020	14.5	14.2	9.4	61.9	
	10:21	12/11/2020	23.0	25.8	0.8	50.4	
	14:05	12/17/2020	12.0	11.6	11.5	64.9	
	14:01	12/18/2020	11.0	10.2	12.4	66.4	
	14:01	12/22/2020	24.5	22.8	3.7	49.0	
LC-2	14:17	10/13/2020	22.5	25.8	1.1	50.6	
	10:37	10/28/2020	27.4	26.2	0.1	46.3	
	14:36	11/6/2020	28.5	25.0	1.5	45.0	
	11:22	11/11/2020	29.0	26.4	0.2	44.4	
	13:49	11/18/2020	33.5	26.4	1.8	38.3	
	14:08	12/9/2020	29.0	25.4	1.8	43.8	
	10:29	12/11/2020	30.0	27.0	1.5	41.5	
	14:13	12/17/2020	28.5	25.8	2.1	43.6	
	14:08	12/22/2020	29.5	25.8	1.6	43.1	
LC-3	14:15	10/13/2020	14.0	21.0	2.9	62.1	
	10:41	10/28/2020	19.7	22.8	1.9	55.6	
	14:39	11/6/2020	18.5	23.2	2.3	56	
	11:03	11/11/2020	18.2	22.0	2.0	57.8	
	13:46	11/18/2020	20.5	21.8	3.1	54.6	
	14:06	12/9/2020	21.5	22.0	3.1	53.4	
	10:26	12/11/2020	22.0	23.4	3.1	51.5	
	14:11	12/17/2020	20.5	21.8	3.4	54.3	
	14:06	12/22/2020	21.5	21.8	3.4	53.3	
GV-4	14:07	10/13/2020	1.2	9.4	10.3	79.1	
	10:53	10/28/2020	1.8	11	9.7	77.6	
	14:04	11/6/2020	1.6	8.8	10.3	79.3	Extraction header valve closed due to low methane and elevated oxygen.
	11:09	11/11/2020	0.0	0.2	20.8	79.0	Extraction header valve remains closed
	13:24	11/18/2020	6.0	13.2	5.0	75.8	Extraction header valve remains closed
	13:58	12/9/2020	0.0	0.0	20.9	79.1	Extraction header valve remains closed
	10:19	12/11/2020	0.0	0.0	20.9	79.1	Extraction header valve remains closed
	14:03	12/17/2020	1.3	1.6	19.0	78.1	Extraction header valve remains closed
	13:58	12/22/2020	0.0	0.6	20.2	79.2	Extraction header valve remains closed
GV-6	14:10	10/13/2020	3.3	9.6	10.5	76.6	
	10:45	10/28/2020	4.4	10.6	10.8	74.2	
	14:46	11/6/2020	3.7	10.4	9.5	76.4	Extraction header valve closed due to low methane and elevated oxygen.
	10:58	11/11/2020	0.2	8.1	10.5	81.2	Extraction header valve remains closed
	13:36	11/18/2020	3.85	17.8	0.6	77.8	Extraction header valve remains closed
	14:02	12/9/2020	9.5	16.2	1.3	73.0	Extraction header valve opened 1 turn
	10:23	12/11/2020	2.4	7.8	11.5	78.4	Extraction header valve closed due to low methane and elevated oxygen.
	14:07	12/17/2020	4.9	15	3.0	77.2	Extraction header valve remains closed
	14:03	12/22/2020	9.0	17.4	0.8	72.8	Extraction header valve remains closed
GP-1	13:50	10/13/2020	0.0	7.8	8.3	83.9	
	14:51	10/13/2020	0.0	7.8	8.0	84.2	
	10:59	10/28/2020	0.0	3.2	16.4	80.4	
	13:47	11/6/2020	0.0	0.2	20.8	79.0	
	14:50	11/6/2020	0.0	0.4	20.9	78.7	
	11:31	11/11/2020	0.0	0.9	20.1	79.0	

Table 6: Landfill Gas Field Parameter Monitoring Results - Fourth Quarter 2020
FF/NN Landfill
Ripon, Wisconsin

Monitoring Point	Time	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	N (%)	Comments
GP-1 (continued)	13:21	11/18/2020	0.0	0	20.9	79.1	
	14:44	11/18/2020	0.0	0.2	20.9	78.9	
	13:46	12/9/2020	0.0	3.6	9.7	86.7	
	14:46	12/9/2020	0.0	3.6	9.7	86.7	
	10:04	12/11/2020	0.0	3.8	9.6	86.6	
	11:04	12/11/2020	0.0	3.8	9.6	86.6	
	13:47	12/17/2020	0.0	3.0	11.4	85.6	
	14:47	12/17/2020	0.0	3.4	11.0	85.6	
	13:41	12/22/2020	0.0	3.8	9.4	86.8	
GP-2	14:02	10/13/2020	0.0	5.2	13.7	81.1	
	11:27	10/28/2020	0.0	5.6	14.0	80.4	
	14:01	11/6/2020	0.0	4.4	13.6	82.0	
	11:57	11/11/2020	0.0	2.3	17.5	80.2	
	13:33	11/18/2020	0.0	6.6	10.7	82.7	
	13:55	12/9/2020	0.0	0.6	20.7	78.7	
	10:16	12/11/2020	0.0	0.0	20.9	79.1	
	13:59	12/17/2020	0.0	0.4	20.9	78.7	
	13:53	12/22/2020	0.0	3.4	14.9	81.7	
GP-3	11:31	10/28/2020	0.0	3.9	16.5	79.6	
	12:07	11/11/2020	0.0	0.1	20.8	79.1	
GP-4	11:41	10/28/2020	0.0	2.7	18.3	79.0	
	12:14	11/11/2020	0.0	0.6	20.4	79.0	
GP-5	11:03	10/28/2020	0.0	5.9	14.3	79.8	
	11:34	11/11/2020	0.0	3.4	16.7	79.9	
GP-6	11:53	10/28/2020	0.0	3.3	17.2	79.5	
	12:26	11/11/2020	0.0	0.7	20.2	79.1	
GP-7	11:50	10/28/2020	0.0	4.2	16.4	79.4	
	12:22	11/11/2020	0.0	0.2	20.7	79.1	
GP-10	11:17	10/28/2020	0.0	5.5	12.4	82.1	
	11:54	11/11/2020	0.0	4.5	13.3	82.2	
GP-11	16:05	10/28/2020	0.0	3.0	19.0	78.0	
	11:46	11/11/2020	0.0	2.2	19.5	78.3	
GP-12	11:11	10/28/2020	0.0	6.3	14.2	79.5	
	11:39	11/11/2020	0.0	5.7	14.5	79.8	
Exhaust	13:55	10/13/2020	1.6	3.8	16.8	77.9	
	10:31	10/28/2020	1.8	4.2	17	77.1	
	13:56	11/6/2020	2.1	3.8	16.6	77.5	
	10:51	11/11/2020	1.8	2.3	18.8	77.1	
	13:28	11/18/2020	2.4	2.0	19.2	76.4	
	13:49	12/9/2020	1.9	1.8	19.5	76.9	
	10:10	12/11/2020	1.7	2.0	19.1	77.2	
	13:53	12/17/2020	1.9	1.6	20.1	76.5	
	13:47	12/22/2020	1.9	1.6	19.8	76.7	
MW-101	12:11	10/28/2020	0.0	2.1	18.5	79.4	
	11:50	11/11/2020	0.0	0.2	20.8	79.0	
MW-102	--	10/28/2020	0.0	1.5	18.1	80.4	
	11:36	11/11/2020	0.0	1.7	19.0	79.3	
MW-103	11:36	10/28/2020	0.0	0.2	20.9	78.9	
	12:11	11/11/2020	0.0	0.3	20.5	79.2	
MW-104	12:06	10/28/2020	0.0	13.6	2.9	83.5	
	12:03	11/11/2020	0.0	0.5	20.5	79.0	

Notes:

Updated/Checked by: T. Perkins 2/8/2021

Checked by A. Stehn 2/9/2021

-- = Data not recorded

LEL = Lower Explosive Limit

CH_4 = Methane

CO_2 = Carbon Dioxide

O_2 = Oxygen

N = Nitrogen

% = Percent

Ph = gas reading collected from the extraction header

Pw = gas reading collected from the extraction well

VAPOR VOC ANALYSIS

Table 6: Detected Parameters in Vapor
FF/NN Landfill
Ripon, Wisconsin
Second Quarter 2020

Parameter	Units	GP-03 4/28/2020 P2002385-005	GV-06 4/28/2020 P2002385-004	LC-1 4/28/2020 P2002385-003	LC-2 4/27/2020 P2002385-002	LC-3 4/27/2020 P2002385-001
Organic Analytes						
1,1-Dichloroethane	nL/L	< 2.3	8.6	5.5	< 23	< 18
1,1-Dichloroethene	nL/L	< 2.2	< 4.3	< 4.6	< 22	54
1,2,4-Trimethylbenzene	nL/L	4.7	< 4.3	< 4.6	< 22	< 18
2-Butanone	nL/L	5.3	< 8.9	< 9.3	< 45	55
Acetone	nL/L	< 22	< 43	< 45	< 220	370
alpha-Pinene	nL/L	< 2.2	< 4.3	< 4.6	< 22	71
Benzene	nL/L	< 2.2	26	35	330	250
Chloroethane	nL/L	< 2.2	70	21	400	57
cis-1,2-Dichloroethene	nL/L	< 2.2	< 4.3	4.9	23	3200
Cyclohexane	nL/L	< 4.5	270	170	1100	490
Dichlorodifluoromethane	nL/L	4.4	1100	370	1200	1900
Dichlorotetrafluoroethane	nL/L	< 2.2	400	120	1600	530
D-Limonene Gas	nL/L	2.5	< 4.3	< 4.6	< 22	< 18
Ethanol Gas	nL/L	42	< 42	< 44	< 210	< 170
Ethyl acetate	nL/L	7.2	< 8.9	< 9.3	< 45	< 36
Ethylbenzene	nL/L	< 2.2	< 4.3	< 4.6	< 22	22
Fluorotrichloromethane	nL/L	< 2.2	12	< 4.5	< 22	42
Heptane	nL/L	< 2.2	270	200	2000	870
Methylene chloride	nL/L	< 2.2	< 4.3	< 4.5	< 22	54
Methyl-tert-butyl-ether	nL/L	< 2.2	4.4	< 4.6	< 22	< 18
n-Hexane	nL/L	< 2.2	810	570	3800	1100
n-Nonane	nL/L	< 2.2	< 4.3	< 4.6	53	370
n-Octane	nL/L	< 2.2	42	97	540	470
Propylene	nL/L	2.6	950	620	2200	1900
Tetrahydrofuran	nL/L	< 2.3	< 4.4	16	97	170
Toluene	nL/L	3.6	< 4.3	5.4	< 22	1600
trans-1,2-dichloroethene	nL/L	< 2.2	< 4.3	< 4.6	< 22	34
Trichloroethene	nL/L	< 2.2	< 4.3	< 4.6	< 22	240
Vinyl chloride	nL/L	< 2.2	170	11	31	3300

Notes:

1. nL/L = nanoliter per liter

Created by: P. Popp

Reviewed by: A. Sobbe

APPENDIX E – GROUNDWATER DATA

MONITORING PLAN

Table 2: Current Groundwater Monitoring Plan
FF/NN Landfill
Ripon, Wisconsin

Well/Point ID	Current Monitoring Plan			
	Q1	Q2	Q3	Q4
Layer 1 Monitoring Wells				
MW-101		WL		
MW-102		WL		
MW-103		V + NA	V + NA	
MW-104		V		
MW-106		WL		
MW-107		V		
MW-108		WL		
MW-111		WL		
MW-112		V + NA	V + NA	
Layer 2 Piezometers				
P-101		WL		
P-102		WL		
P-103		V + NA	V + NA	
P-104		WL		
P-106		V		
P-107		V		
P-108		WL		
P-111		WL		
Layer 3 Piezometers				
MW-3B	V + NA	V + NA	V + NA	V + NA
P-103D	V + NA	V + NA	V + NA	V + NA
P-111D	V + NA	V + NA	V + NA	V + NA
P-113B	V + NA	V + NA	V + NA	V + NA
P-114	V + NA	V + NA	V + NA	V + NA
P-115	V + NA	V + NA	V + NA	V + NA
P-116	V + NA	V + NA	V + NA	V + NA
P-117	V + NA	V + NA	V + NA	V + NA
P-118	V + NA	V + NA	V + NA	V + NA
Layer 4 Piezometers				
MW-3A	V + NA	V + NA	V + NA	V + NA
P-107D	V + NA	V + NA	V + NA	V + NA
P-113A	V + NA	V + NA	V + NA	V + NA
Private Well				
Rohde (8")		V*		
Landfill Monitoring Points				
LC-1		L + G		
LC-2		L + G		
LC-3		L + G		
GV-6		G		
GP-3		G		

Notes:

Updated By: A. Stehn 3/2/2021

Q1, Q2, Q3, Q4 = quarterly sampling events

Checked By: S. Sellwood, 3/2/2021

V = measure water level and collect groundwater sample for VOCs analysis (EPA 8260C)

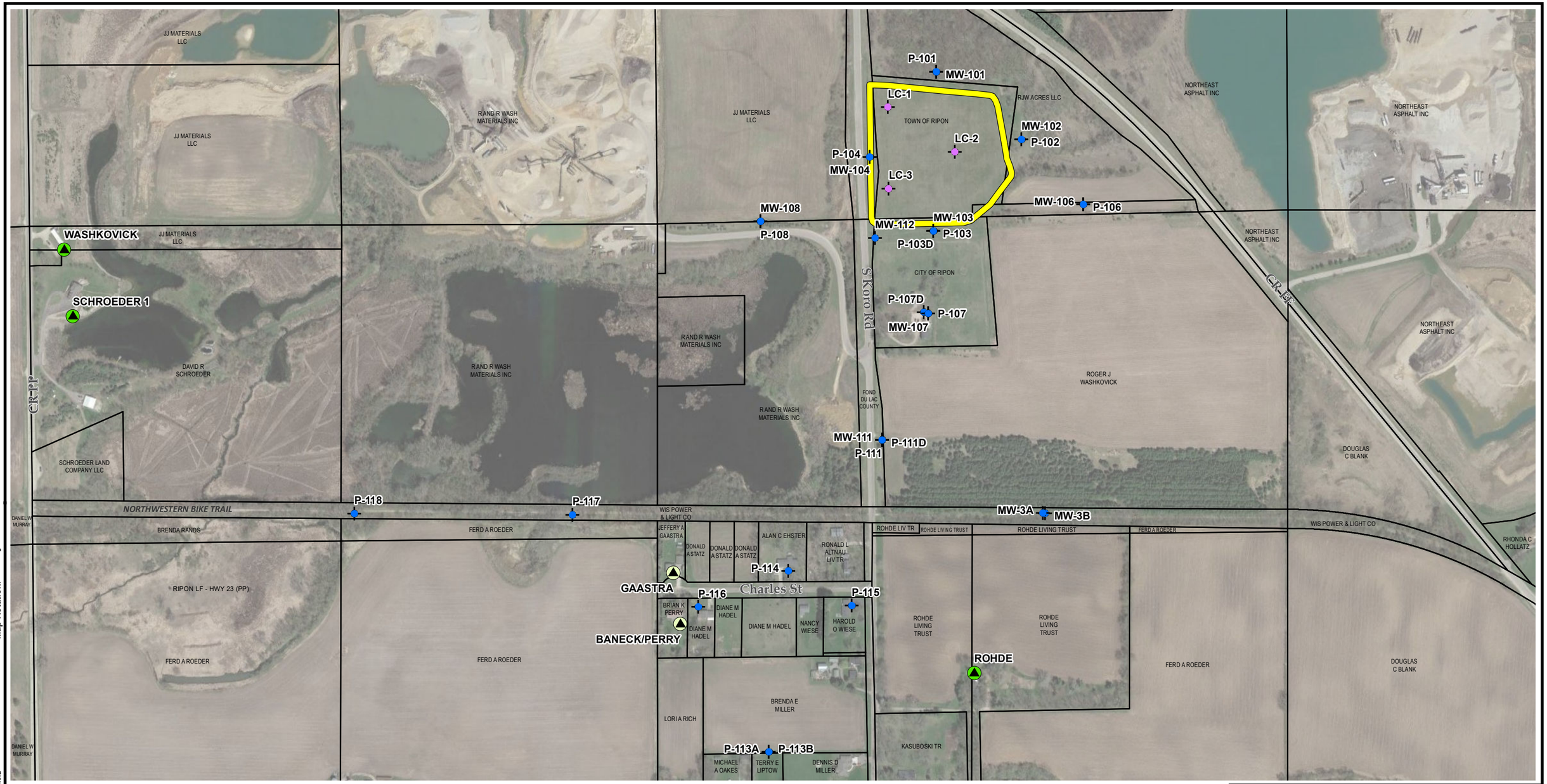
V* = collect groundwater sample for VOCs analysis (EPA 524.2)

NA = collect groundwater sample for sulfate (EPA 9056A), nitrate+nitrite (EPA 353.2), and dissolved Mn (EPA 6010C) analysis

WL = water level measurement only

L = collect leachate sample for VOCs analysis (EPA 8260C)

G = collect gas sample for VOCs analysis (EPA Method TO-15) during groundwater monitoring event



LEGEND

- LEACHATE HEAD WELL
- MONITORING WELL, PIEZOMETER LOCATION
- PRIVATE WELL USED FOR POTABLE PURPOSES
- PRIVATE WELL NOT USED FOR POTABLE PURPOSES
- APPROXIMATE EXTENT OF RIPON FF/NN LANDFILL

NOTES

1. BASE MAP IMAGERY FROM GOOGLE, (4/21/2017).

0 400 800 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
THIRD QUARTER 2020 REPORTING

TITLE:
WELL LOCATION MAP

DRAWN BY:	R. SUEMNICHT	PROJ. NO.:	421748
CHECKED BY:	A.SOBBE		
APPROVED BY:	A.STEHN		
DATE:	FEBRUARY 2021		

FIGURE 3

TRC
150 North Patrick Blvd., Suite 180
Brookfield, WI 53045
Phone: 262.879.1212
www.trcsolutions.com

FILE NO.: 421748-2020-Q3-004-SL.mxd

Plot Date: 2/22/2021, 13:59:51 PM by RSUEMNICHT -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Ripon\421748-2020-Q3-004-SL.mxd
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0
TRC - GIS

CROSS SECTION

B
WEST

B'
EAST

ELEVATION (ft. msl)

880
870
860
850
840
830
820
810
800
790
780
770

County Highway NN

MW-104
P-104

MW-108
P-108

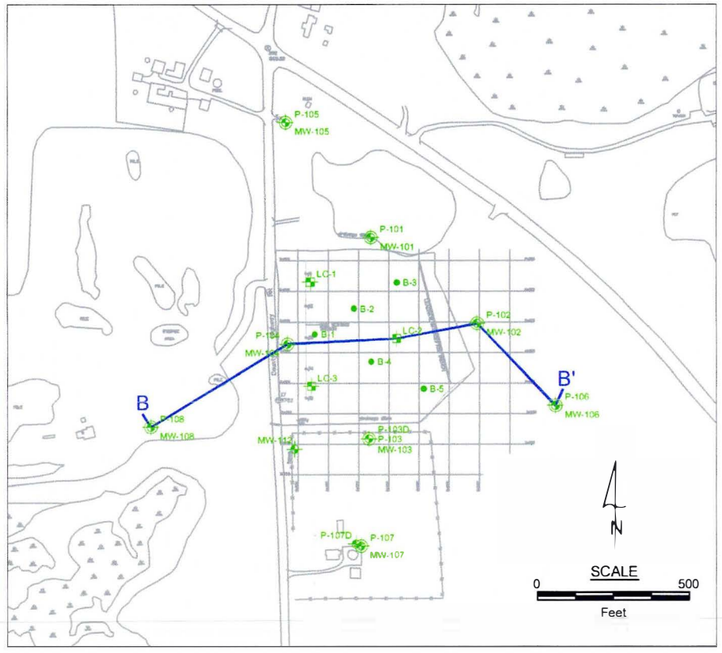
LC-2

MW-102
P-102

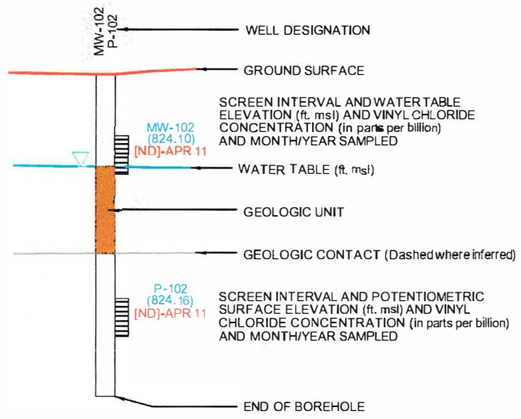
MW-106
P-106

SILTY CLAY
GRAVEL GRADING
TOPSOIL
CLAY
MEDIUM TO COARSE SAND
WASTE
SILT & FINE SAND LENSE
(838.40) [ND]-APR 11
MW-108 (818.51) [ND]-APR 11
MW-104 (823.47) [ND]-APR 11
MW-102 (824.10) [ND]-APR 11
MW-106 (824.02) [ND]-APR 11
FINE SAND
SAND & GRAVEL
SILT
SAND
P-108 (821.32) [ND]-APR 11
P-104 (823.62) [ND]-APR 11
P-102 (824.16) [ND]-APR 11
P-106 (823.94) [ND]-APR 11
MEDIUM SAND
TOPSOIL
SILTY CLAY
MEDIUM TO COARSE SAND
SAND

CROSS SECTION LOCATION MAP



BOREHOLE LEGEND



Notes : ND = NOT DETECTED:
No vinyl chloride was detected in ground water samples collected at this location.

NA = NOT ANALYZED

All water table elevations, leachate head levels, and potentiometric surface elevations are from April 2011.

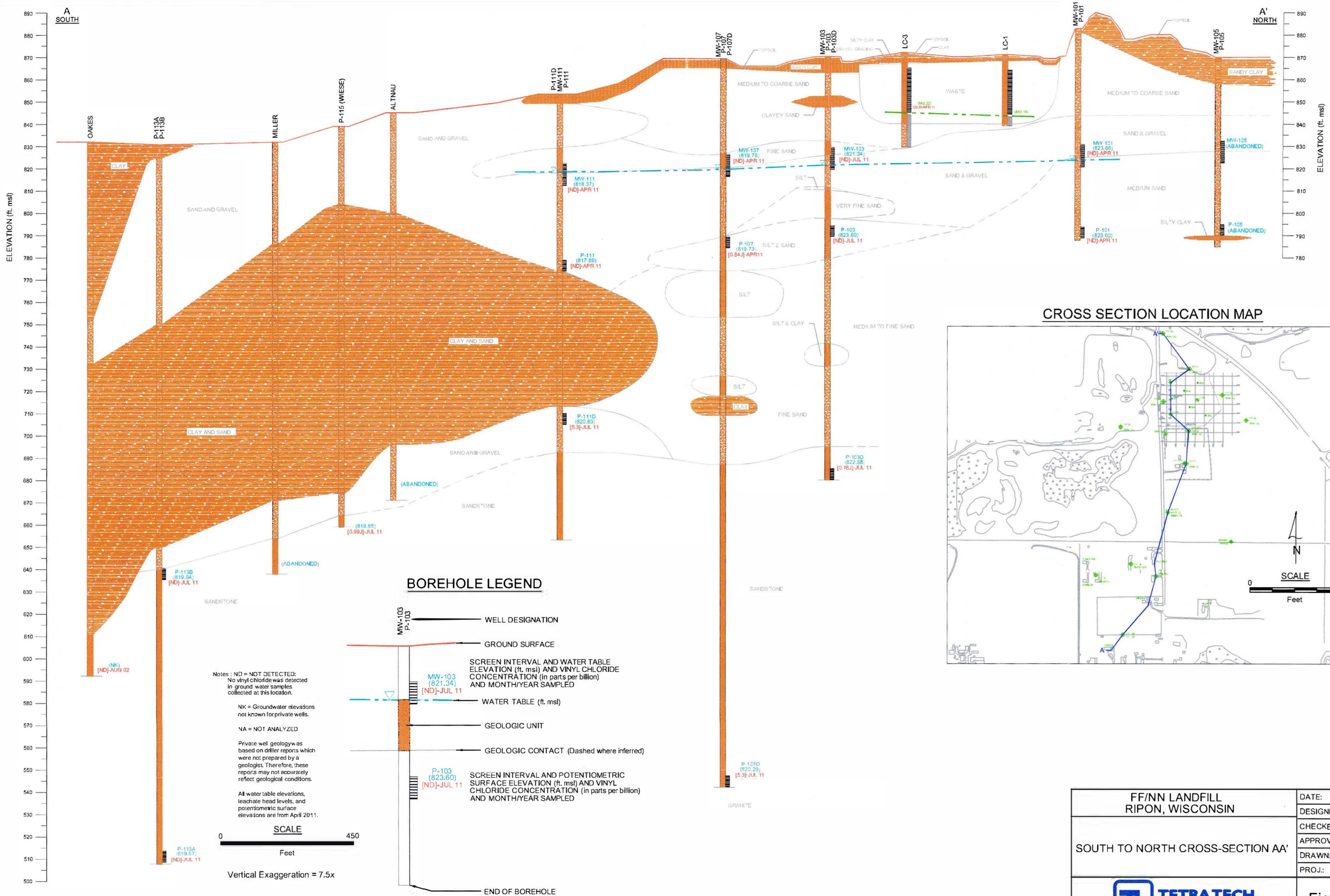
SCALE
0 225
Feet

Vertical Exaggeration = 7.5x

FF/NN LANDFILL RIPON, WISCONSIN	DATE: 9/1/11
	DESIGNED: HJW
	CHECKED: AAW
WEST TO EAST CROSS-SECTION BB'	APPROVED: MRN
	DRAWN: HJW
	PROJ.: 2202.040

TETRA TECH

Figure 3-3



BOREHOLE LEGEND

Notes : ND = NOT DETECTED:
No vinyl chloride was detected in ground water samples collected at this location.

NK = Groundwater elevations not known for private wells.

NA = NOT ANALYZED

Private well geology was based on driller reports which were not prepared by a geologist. Therefore, these reports may not accurately reflect geological conditions.

All water table elevations, leachate head levels, and potentiometric surface elevations are from April 2011.

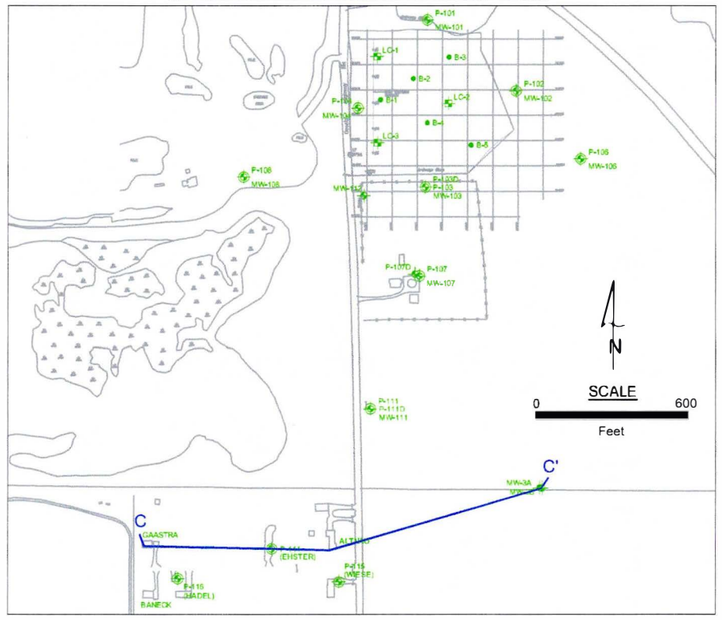
SCALE
0 450
Feet

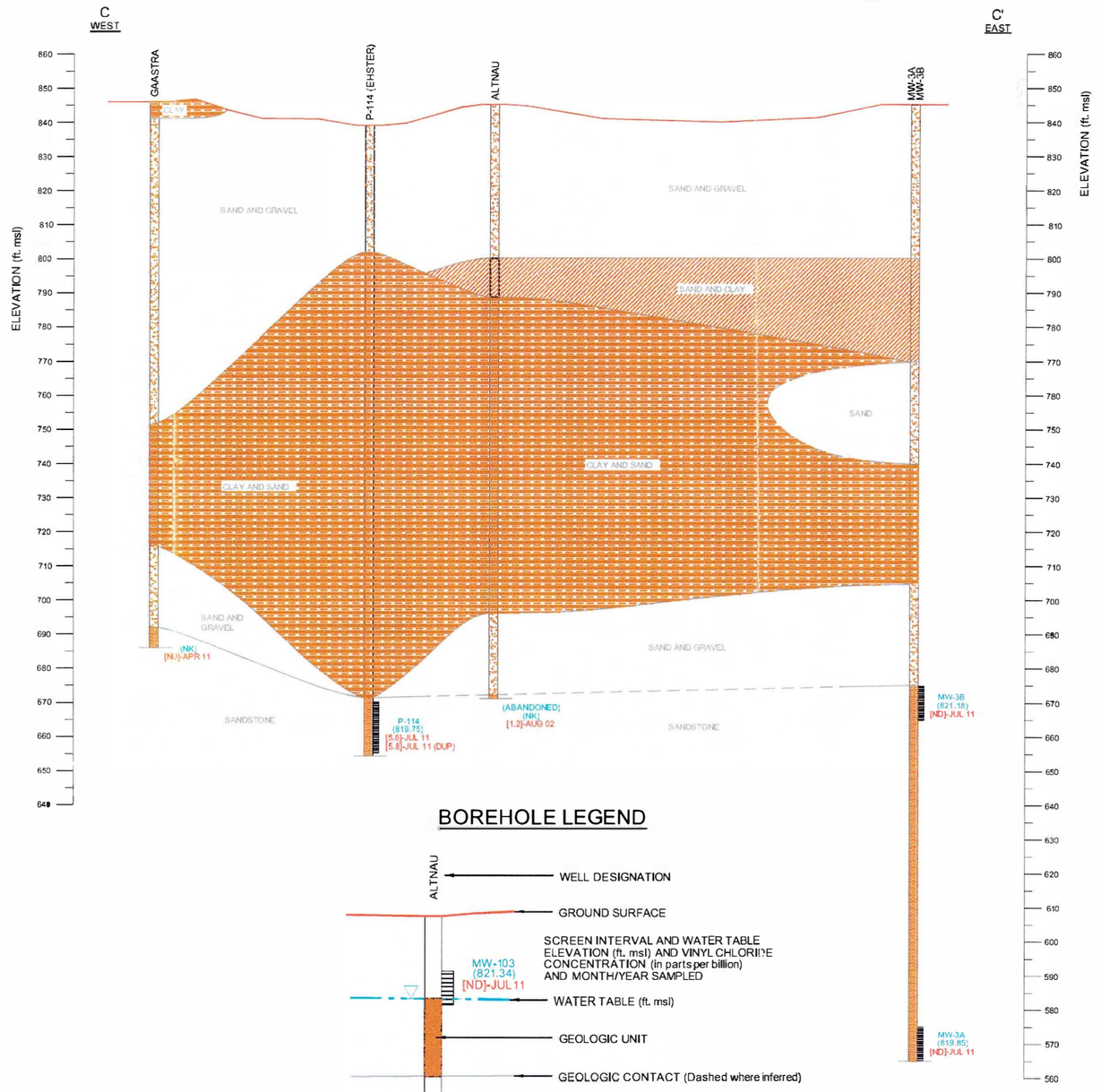
Vertical Exaggeration = 7.5x

CROSS SECTION LOCATION MAP

FF/NN LANDFILL RIPON, WISCONSIN	DATE:	9/1/11
	DESIGNED:	HJW
	CHECKED:	AAW
SOUTH TO NORTH CROSS-SECTION AA'	APPROVED:	MRN
	DRAWN:	HJW
	PROJ.:	2202.040
TETRA TECH	Figure 3-2	

CROSS SECTION LOCATION MAP





BOREHOLE LEGEND

SCALE
0 450
Feet

Vertical Exaggeration = 7.5x

Notes : ND = NOT DETECTED:
No vinyl chloride was detected in ground water samples collected at this location.

NK = Groundwater elevations not known for private wells.

NA = NOT ANALYZED

All water table and potentiometric surface elevations are from April 2011.

FF/NN LANDFILL RIPON, WISCONSIN	DATE: 9/1/11
	DESIGNED: HJW
	CHECKED: AAW
WEST TO EAST CROSS-SECTION CC'	APPROVED: MRN
	DRAWN: HJW
	PROJ.: 2202.040
TETRA TECH	Figure 3-4

WATER ELEVATIONS

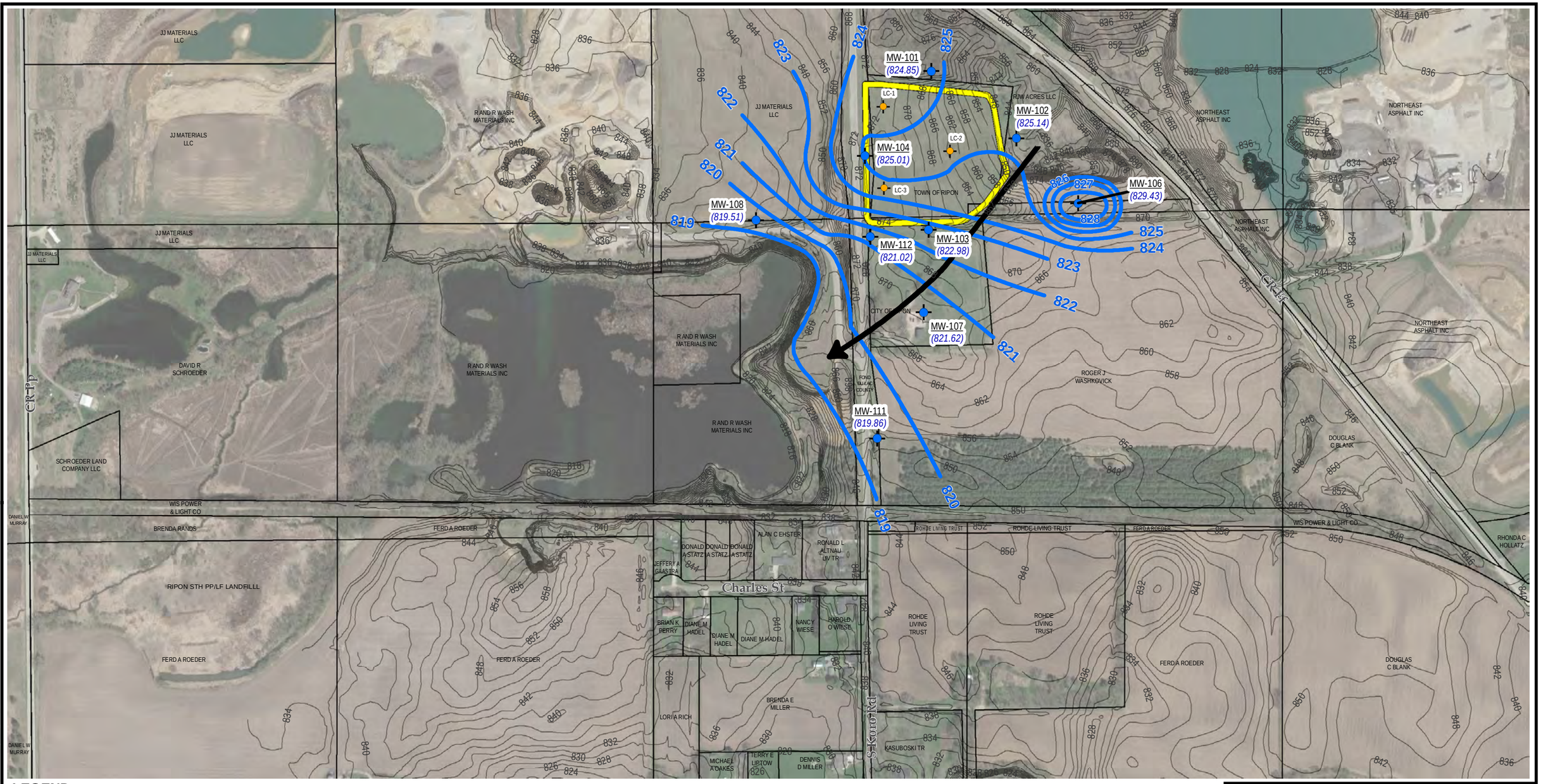
Table 1: Water Levels
FF/NN Landfill
Ripon, Wisconsin
Second Quarter 2020

Well Name	GW Layer	TOC Elevation (Feet AMSL)	Q2 Depth to Water (Feet)	Q2 GW Elevation (Feet AMSL)
			4/27/2020	4/27/2020
MW-101	1	884.73	59.88	824.85
P-101	2	885.39	60.46	824.93
MW-102	1	842.90	17.76	825.14
P-102	2	842.85	17.62	825.23
MW-103	1	872.30	49.32	822.98
P-103	2	872.74	48.05	824.69
P-103D	3	872.91	49.02	823.89
MW-104	1	875.20	50.19	825.01
P-104	2	875.40	50.67	824.73
MW-106	1	878.75	49.32	829.43
P-106	2	878.80	53.71	825.09
MW-107	1	871.69	50.07	821.62
P-107	2	871.33	49.65	821.68
P-107D	4	871.90	49.97	821.93
MW-108	1	845.08	25.57	819.51
P-108	2	845.48	23.37	822.11
MW-111	1	856.09	36.23	819.86
P-111	2	856.28	36.29	819.99
P-111D	3	855.56	33.89	821.67
MW-112	1	874.70	53.68	821.02
P-113A	4	833.16	11.71	821.45
P-113B	3	833.16	11.95	821.21
P-114	3	839.36	18.51	820.85
P-115	3	842.67	21.71	820.96
P-116	3	845.86	25.61	820.25
P-117	3	833.96	14.50	819.46
P-118	3	826.74	7.33	819.41
MW-3A	4	850.60	29.16	821.44
MW-3B	3	850.89	28.63	822.26
LC-1	1	876.15	33.90 (1)	842.25
LC-2	1	866.05	31.66 (1)	834.39
LC-3	1	877.34	35.39 (1)	841.95

Notes:
GW - Groundwater
TOC - Top of Casing
AMSL - Above Mean Sea Level
NM = Well not measured

Created by: P. Popp, 7/1/2020
Checked by: M. Stollenwerk 10/15/20

Footnotes:
(1) Leachate Wells were gauged on 4/28/2020



LEGEND

- MW-112 (821.71) — MONITORING WELL, PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION
- LEACHATE HEAD WELL
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR
- TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 2')
- TAX PARCEL
- RIPON FF/NN LANDFILL SITE

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO., (4/21/2017).

0 200 400 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
SECOND QUARTER 2020 REPORTING

TITLE:
GROUNDWATER ELEVATION MAP
QUARTER 2 LAYER 1 WELLS
APRIL 27, 2020

DRAWN BY:	A. ADAIR	PROJ. NO.:	327275
CHECKED BY:	A.SOBBE		
APPROVED BY:	A.STEHN		**FIGURE 3**
DATE:	JANUARY 2021		

TRC
150 North Patrick Blvd., Suite 180
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Phone: 262.879.1212
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FILE NO.: 2020_378957_Q2_Figure_3_GW.mxd

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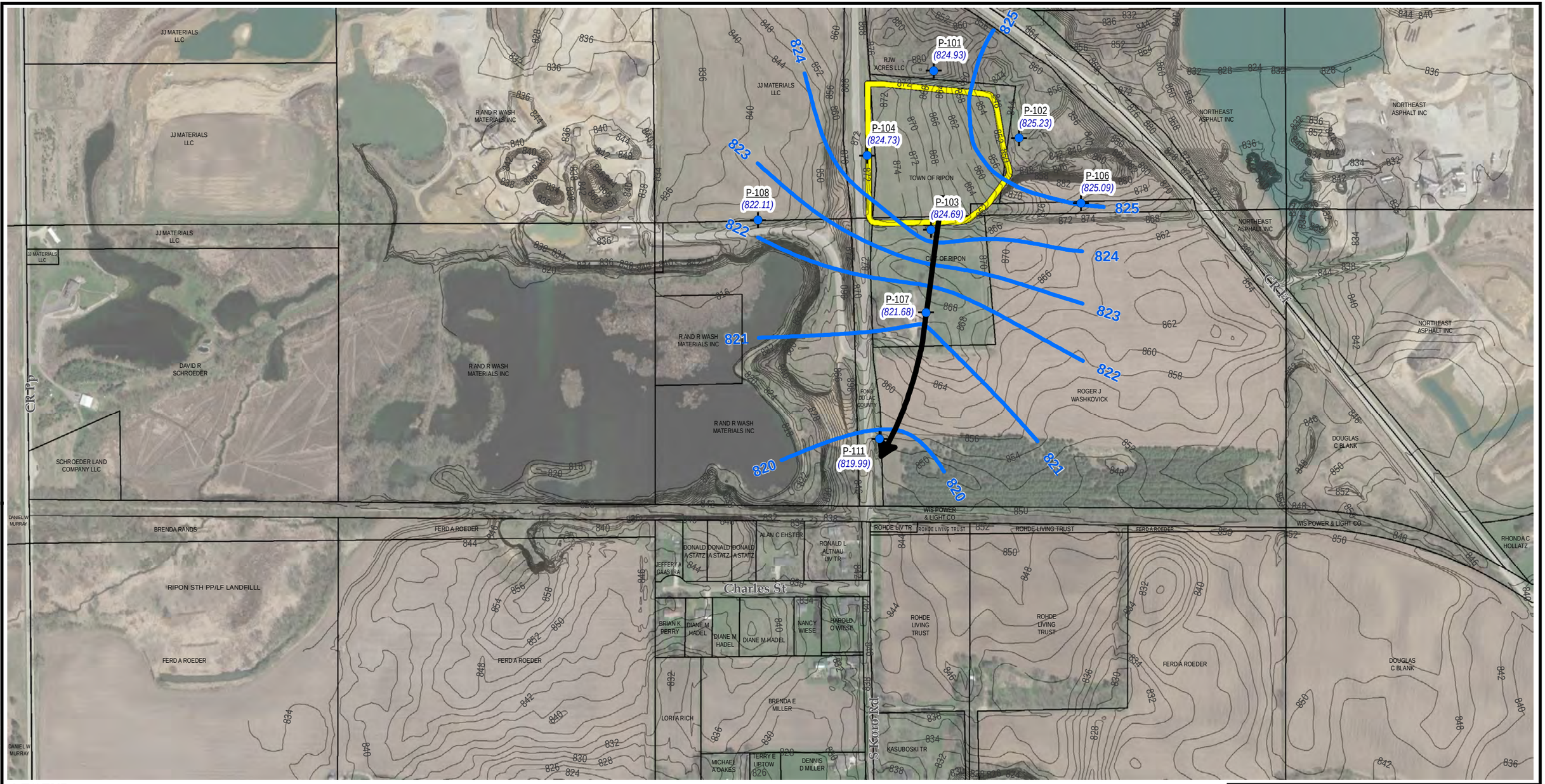
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0

TRC - GIS



LEGEND

- MW-112 (821.71) — MONITORING WELL, PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION
- LEACHATE HEAD WELL
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR
- TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 2')
- TAX PARCEL
- RIPON FF/NN LANDFILL SITE

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO., (4/21/2017).

0 200 400 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
SECOND QUARTER 2020 REPORTING

TITLE:
GROUNDWATER ELEVATION MAP
QUARTER 2 LAYER 2 WELLS
APRIL 27, 2020

DRAWN BY:	A. ADAIR	PROJ. NO.:	327275
CHECKED BY:	A.SOBBE		
APPROVED BY:	A.STEHN		**FIGURE 4**
DATE:	JANUARY 2021		

TRC
150 North Patrick Blvd., Suite 180
Brookfield, WI 53045
Phone: 262.879.1212
www.trcsolutions.com

FILE NO.: 2020_378957_Q2_Figure_4_GW.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0
Plot Date: 1/27/2021, 12:32:37 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
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Plot Date: 1/27/2021, 12:34:25 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
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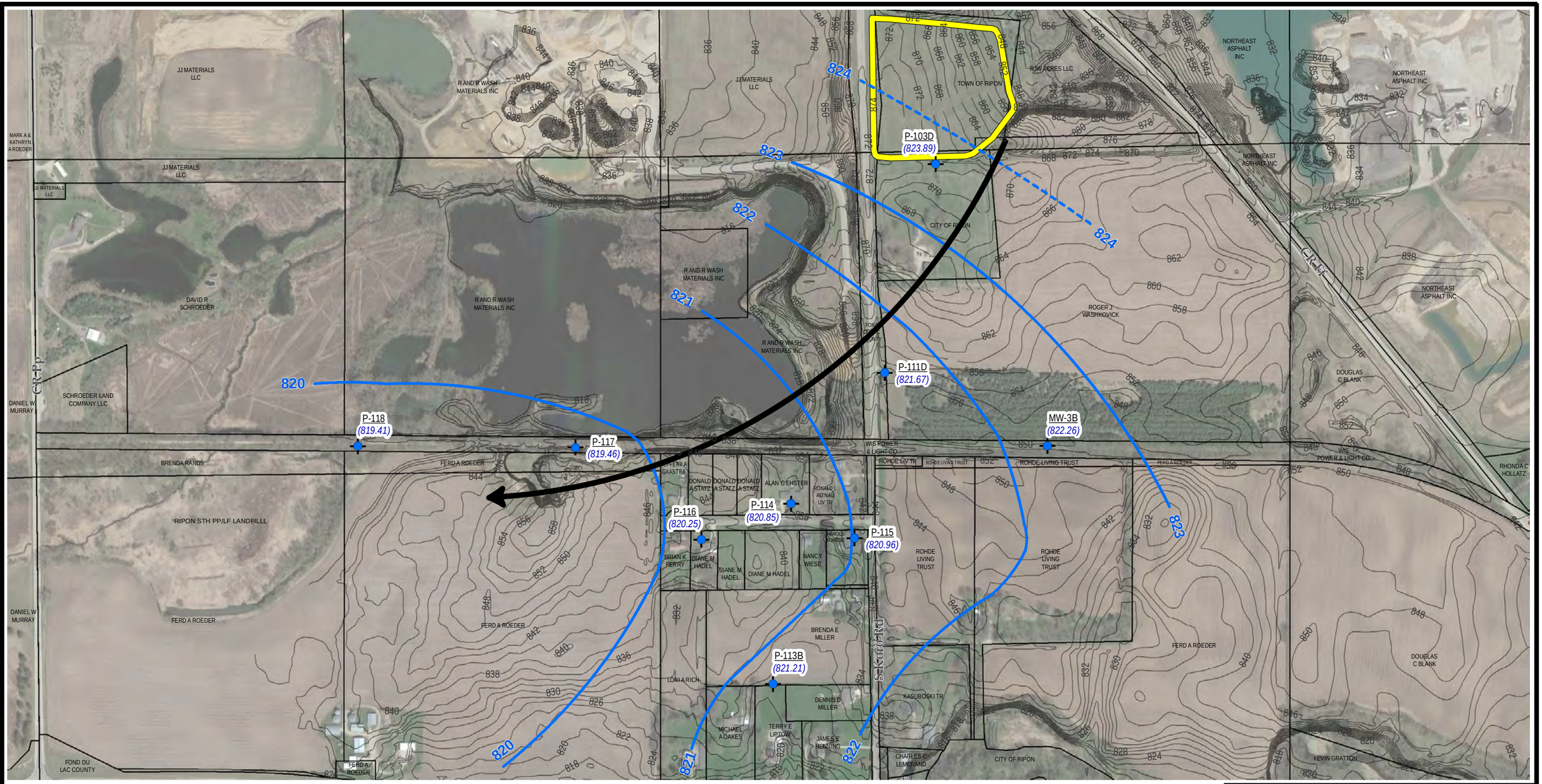
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0



LEGEND

- MW-112 (821.71) — MONITORING WELL, PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 2')
- TAX PARCEL
- RIPON FF/NN LANDFILL

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO., (4/21/2017).

0 200 400 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
SECOND QUARTER 2020 REPORTING

TITLE:
GROUNDWATER ELEVATION MAP
QUARTER 2 LAYER 3 WELLS
APRIL 27, 2020

DRAWN BY:	A. ADAIR	PROJ. NO.:	327275
CHECKED BY:	A.SOBBE		
APPROVED BY:	A.STEHN		**FIGURE 5**
DATE:	JANUARY 2021		

TRC
150 North Patrick Blvd., Suite 180
Brookfield, WI 53045
Phone: 262.879.1212
www.trcsolutions.com

FILE NO.: 2020_378957_Q2_Figure_5.mxd

TRC - GIS

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0

Plot Date: 3/13/2020, 12:41:39 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
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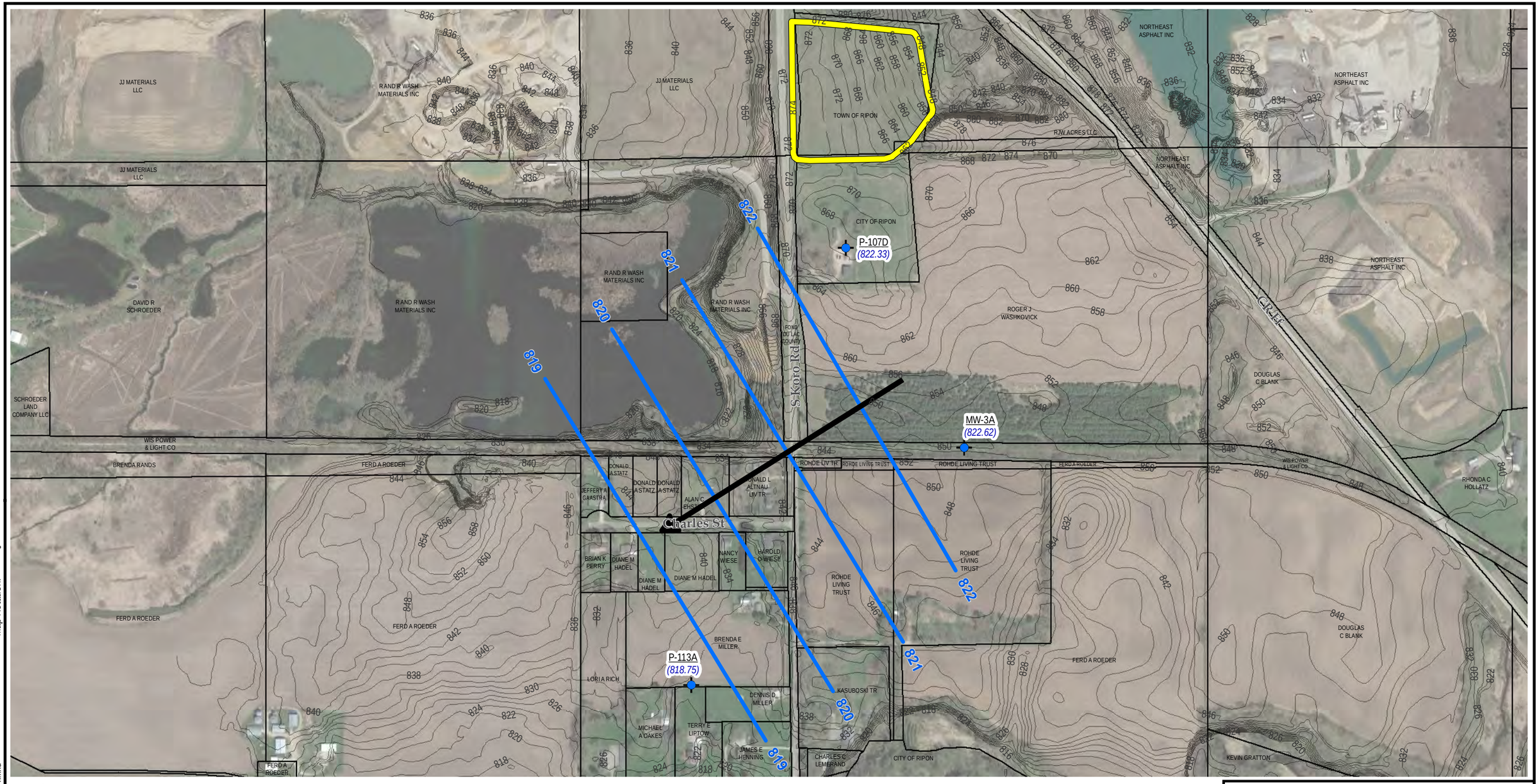


LEGEND

- MW-112 (821.71) — MONITORING WELL, PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION
- PRESUMED GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR
- TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 2')
- TAX PARCEL
- RIPON FF/NN LANDFILL SITE

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO., (4/21/2017).

0 200 400 Feet

1 " = 400 '

1:4,800

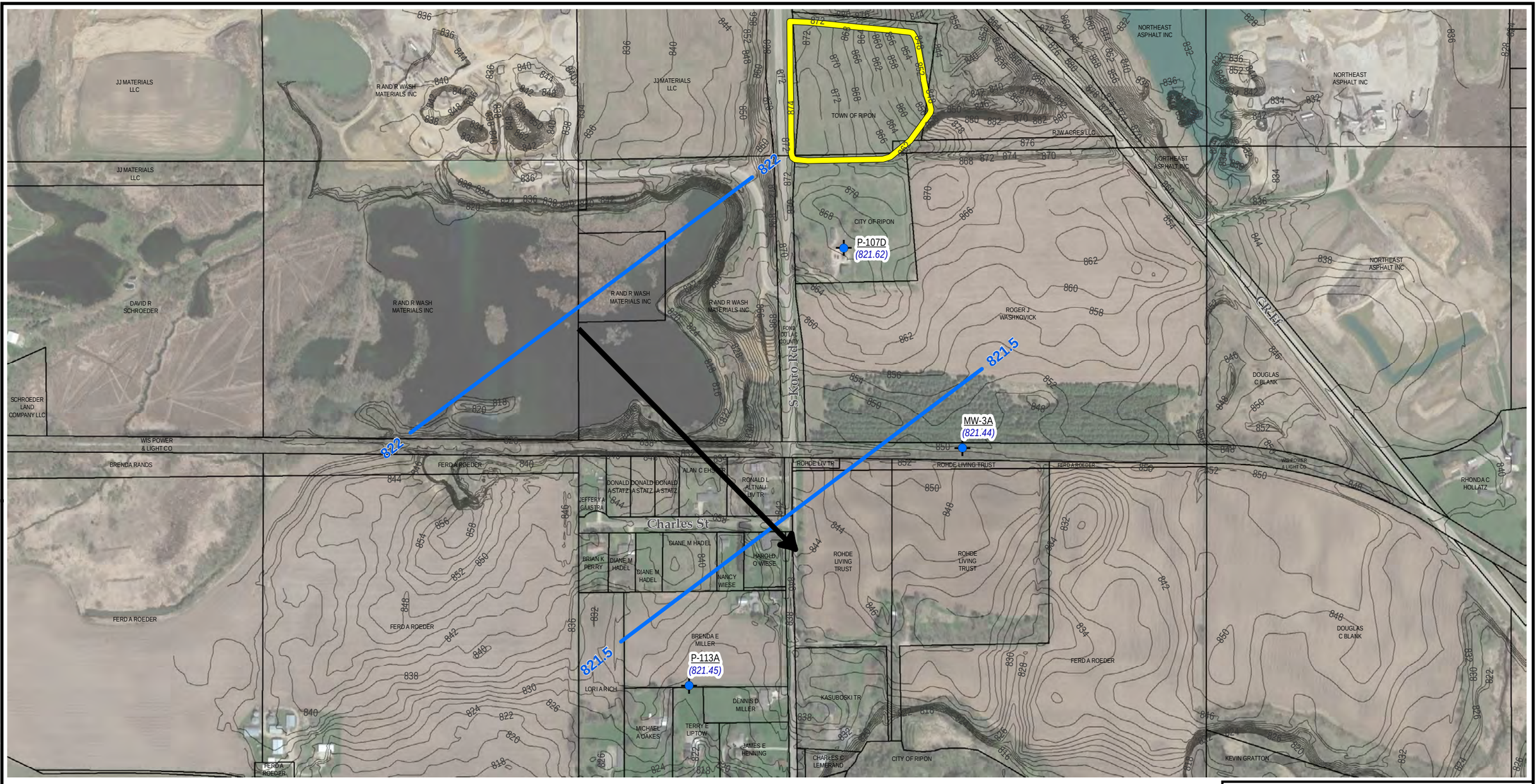
PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
FIRST QUARTER 2020 REPORTING

TITLE:
GROUNDWATER ELEVATION MAP
QUARTER 1 LAYER 4 WELLS
FEBRUARY 25, 2020

DRAWN BY:	A. ADAIR	PROJ. NO.:	327275
CHECKED BY:	M. STOLLENWERK		
APPROVED BY:	J. WEDEKIND		**FIGURE 1**
DATE:	MARCH 2020		

TRC
150 North Patrick Blvd., Suite 180
Brookfield, WI 53045
Phone: 262.879.1212
www.trcsolutions.com

FILE NO.: 2020_378957_Q1_Layer4.mxd



LEGEND

- MW-112 (821.71) — MONITORING WELL, PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION
- PRESUMED GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR
- TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 2')
- TAX PARCEL
- RIPON FF/NN LANDFILL SITE

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO., (4/21/2017).

0 200 400 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
SECOND QUARTER 2020 REPORTING

TITLE:
GROUNDWATER ELEVATION MAP
QUARTER 2 LAYER 4 WELLS
APRIL 27, 2020

DRAWN BY:	A. ADAIR	PROJ. NO.:	327275
CHECKED BY:	A.SOBBE		
APPROVED BY:	A.STEHN		**FIGURE 6**
DATE:	JANUARY 2021		

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Phone: 262.879.1212
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FILE NO.: 2020_378957_Q2_Figure_6.mxd

Plot Date: 1/27/2021, 12:33:27 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
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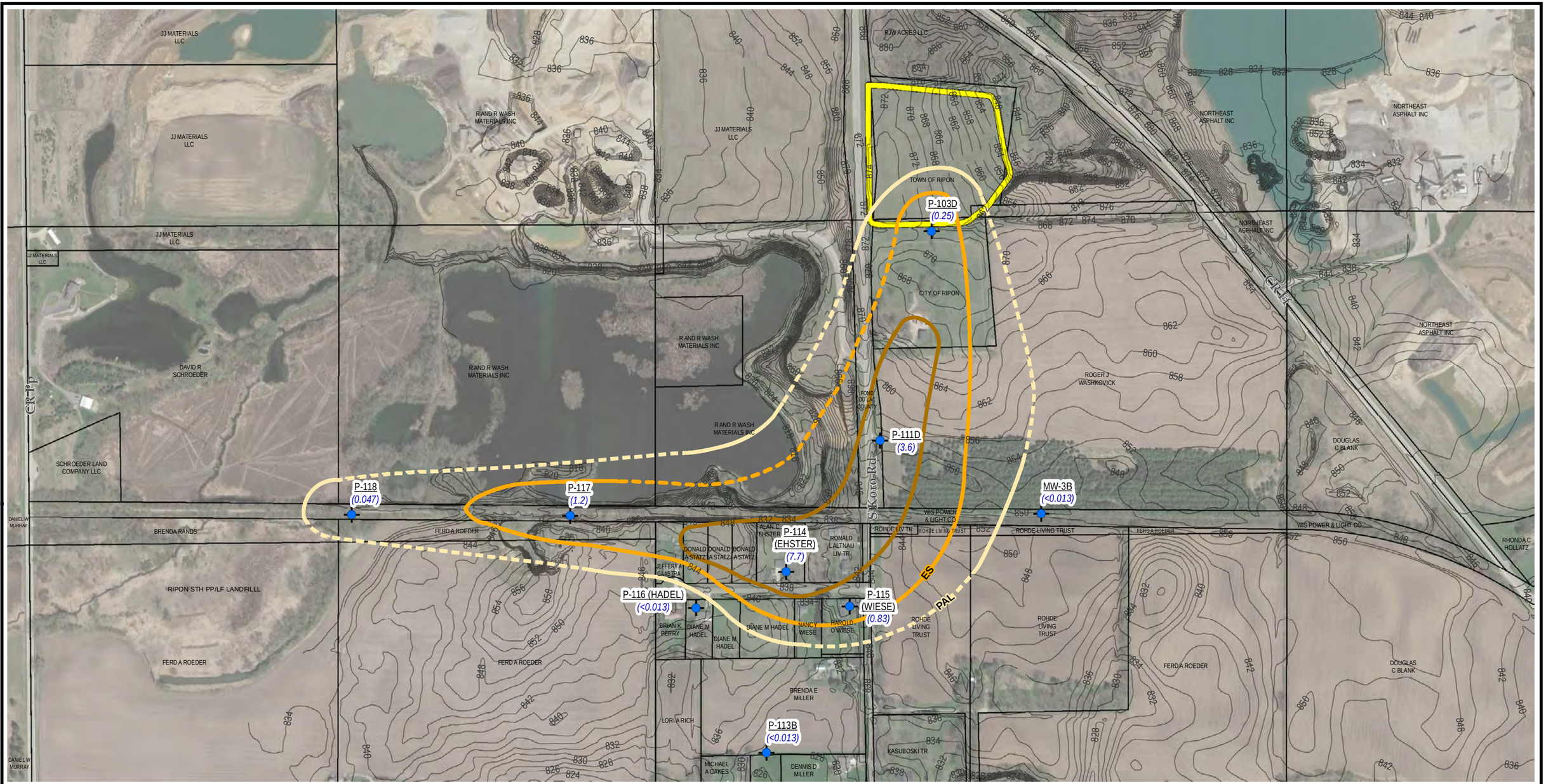
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0
TRC - GIS

GROUNDWATER LABORATORY DATA



LEGEND

- P-117 (1.2) — MONITORING WELL, PIEZOMETER LOCATION WITH VINYL CHLORIDE LEVEL
- PREVENTATIVE ACTION LEVEL VINYL CHLORIDE ISOCONTOUR 0.02 UG/L (DASHED WHERE INFERRED)
- ENFORCEMENT STANDARD VINYL CHLORIDE ISOCONTOUR 0.2 UG/L (DASHED WHERE INFERRED)
- VINYL CHLORIDE ISOCONTOUR 2.0 UG/L (DASHED WHERE INFERRED)
- TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL 2')
- TAX PARCEL
- RIPON FF/NN LANDFILL SITE

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO., (4/21/2017).

0 200 400 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
SECOND QUARTER 2020 REPORTING

TITLE:
VINYL CHLORIDE ISOCONCENTRATION MAP
QUARTER 2 LAYER 3 WELLS
APRIL 27 & 28, 2020

DRAWN BY:	A. ADAIR	PROJ. NO.:	327275
CHECKED BY:	A.SOBBE		
APPROVED BY:	A.STEHN		**FIGURE 7**
DATE:	JANUARY 2021		

TRC
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FILE NO.: 2020_378957_Q2_Figure_7.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0
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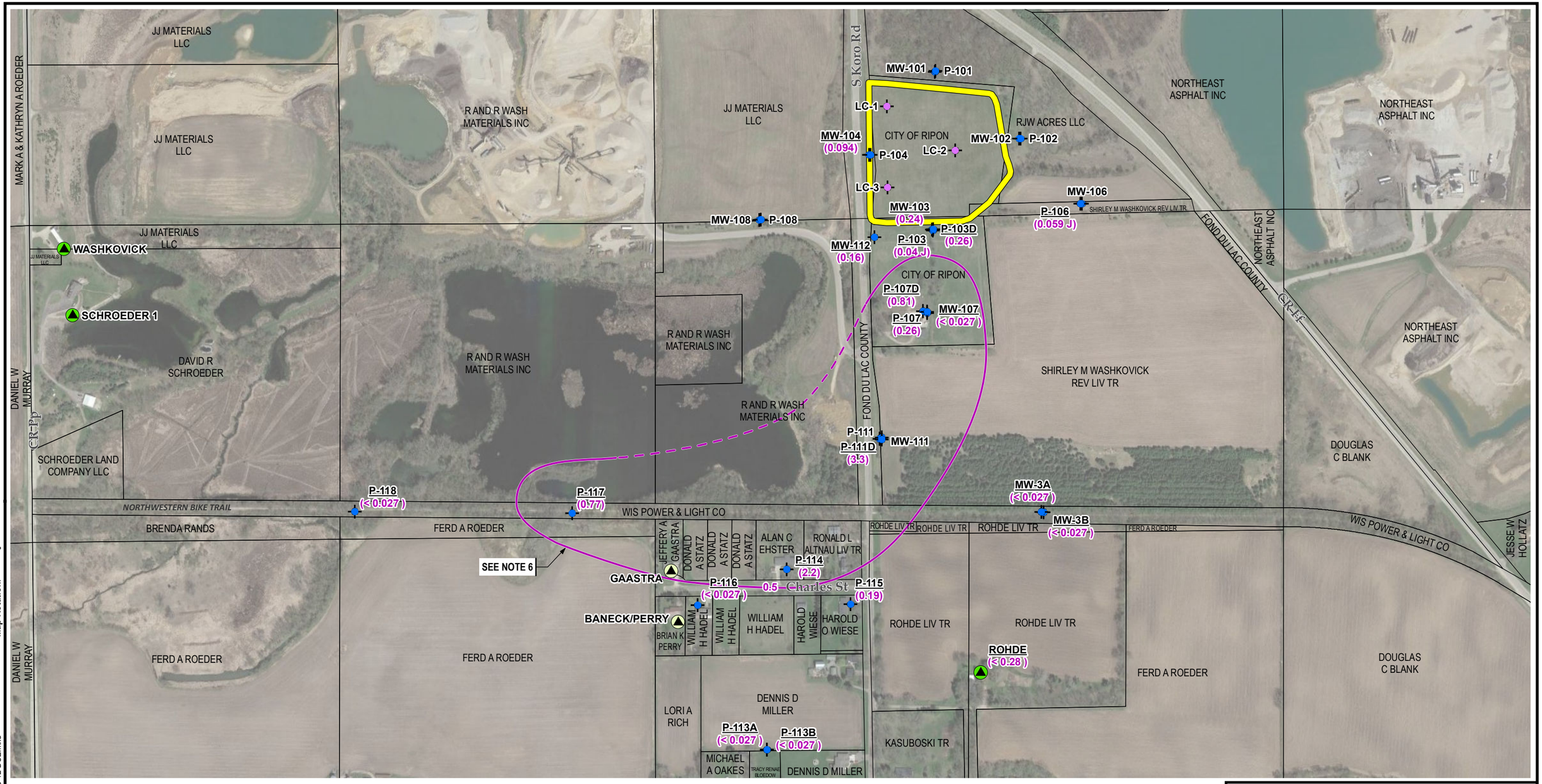

LEGEND

- LEACHATE HEAD WELL
- MONITORING WELL, PIEZOMETER LOCATION
- PRIVATE WELL USED FOR POTABLE PURPOSES
- PRIVATE WELL NOT USED FOR POTABLE PURPOSES
- APPROXIMATE RIPON FF/NN LANDFILL
- TAX PARCEL
- (3.3) CIS-1,2-DCE CONCENTRATION (µg/L)
- CIS-1,2-DCE ISOCONCENTRATION CONTOUR (µg/L, DASHED WHERE INFERRED)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE, (4/21/2017).
2. THE RIPON FF/NN LANDFILL EXTENTS SHOWN ARE BASED ON "SITE LAYOUT" FIGURE PROVIDED BY TETRA TECH, INC. DATED 9/20/18.
3. TAX PARCEL DATA ACQUIRED FROM WISCONSIN STATE CARTOGRAPHER'S OFFICE, 2020.
4. "J" INDICATES AN ESTIMATED LABORATORY RESULT REPORTED ABOVE THE LABORATORY DETECTION LIMIT BUT BELOW THE QUANTITATION LIMIT.
5. "<" INDICATES THE COMPOUND WAS NOT DETECTED ABOVE THE LABORATORY DETECTION LIMIT.
6. NOTE THAT THE 0.5 µG/L ISOCONTOUR FOR CIS-1,2-DCE CORRESPONDS TO A CONCENTRATION MUCH LOWER THAN THE PAL OF 7 µG/L, AND IS INTENDED TO BE USED TO INDICATE THE GENERAL EXTENT OF CIS-1,2-DCE GIVEN THAT NO RECENT CONCENTRATIONS EXCEED NR 140 STANDARDS.

0 400 800 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
FOURTH QUARTER 2020 REPORTING

TITLE:
CIS-1,2-DCE ISOCONCENTRATION MAP QUARTER 2 2020 APRIL 27 AND 28, 2020

DRAWN BY:	R. SUEMNICHT	PROJ. NO.:	421748
CHECKED BY:	S. SELLWOOD		
APPROVED BY:	A. STEHN		**FIGURE 8**
DATE:	MARCH 2021		

TRC
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FILE NO.: 421748-2020-Q4-002-CIS-12-DCE.mxd

Plot Date: 3/2/2021, 16:06:54 PM by RSUEMNICHT -- LAYOUT: ANSI B(11"x17")
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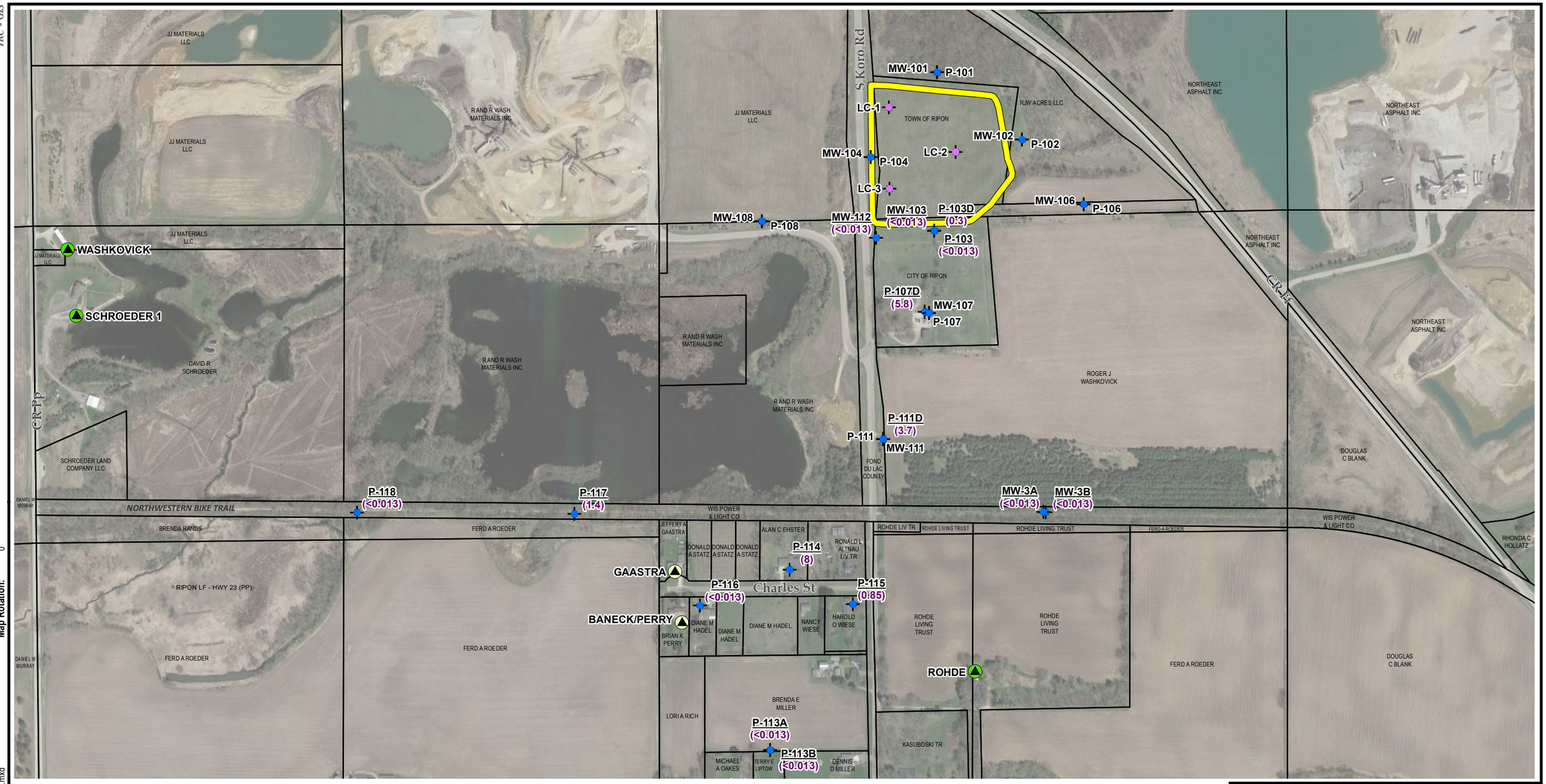
Map Rotation: 0

TRC - GIS



LEGEND

- LEACHATE HEAD WELL
- MONITORING WELL, PIEZOMETER LOCATION
- PRIVATE WELL USED FOR POTABLE PURPOSES
- PRIVATE WELL NOT USED FOR POTABLE PURPOSES
- APPROXIMATE EXTENT OF RIPON FF/NN LANDFILL
- (3.7) VINYL CHLORIDE CONCENTRATION (µg/L)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE, (4/21/2017).

0 400 800 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
THIRD QUARTER 2020 REPORTING

TITLE:
VINYL CHLORIDE RESULTS MAP, JULY 13 AND 14, 2020

DRAWN BY:	R. SUEMNICHT	PROJ. NO.:	421748
CHECKED BY:	L. AUNER		
APPROVED BY:	S. SELLWOOD		**FIGURE 6**
DATE:	FEBRUARY 2021		

TRC
150 North Patrick Blvd., Suite 180
Brookfield, WI 53045
Phone: 262.879.1212
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FILE NO.: 421748-2020-Q3-003-VC.mxd

Plot Date: 2/22/2021, 14:11:49 PM by RSUEMNICHT -- LAYOUT: ANSI B(11"x17")
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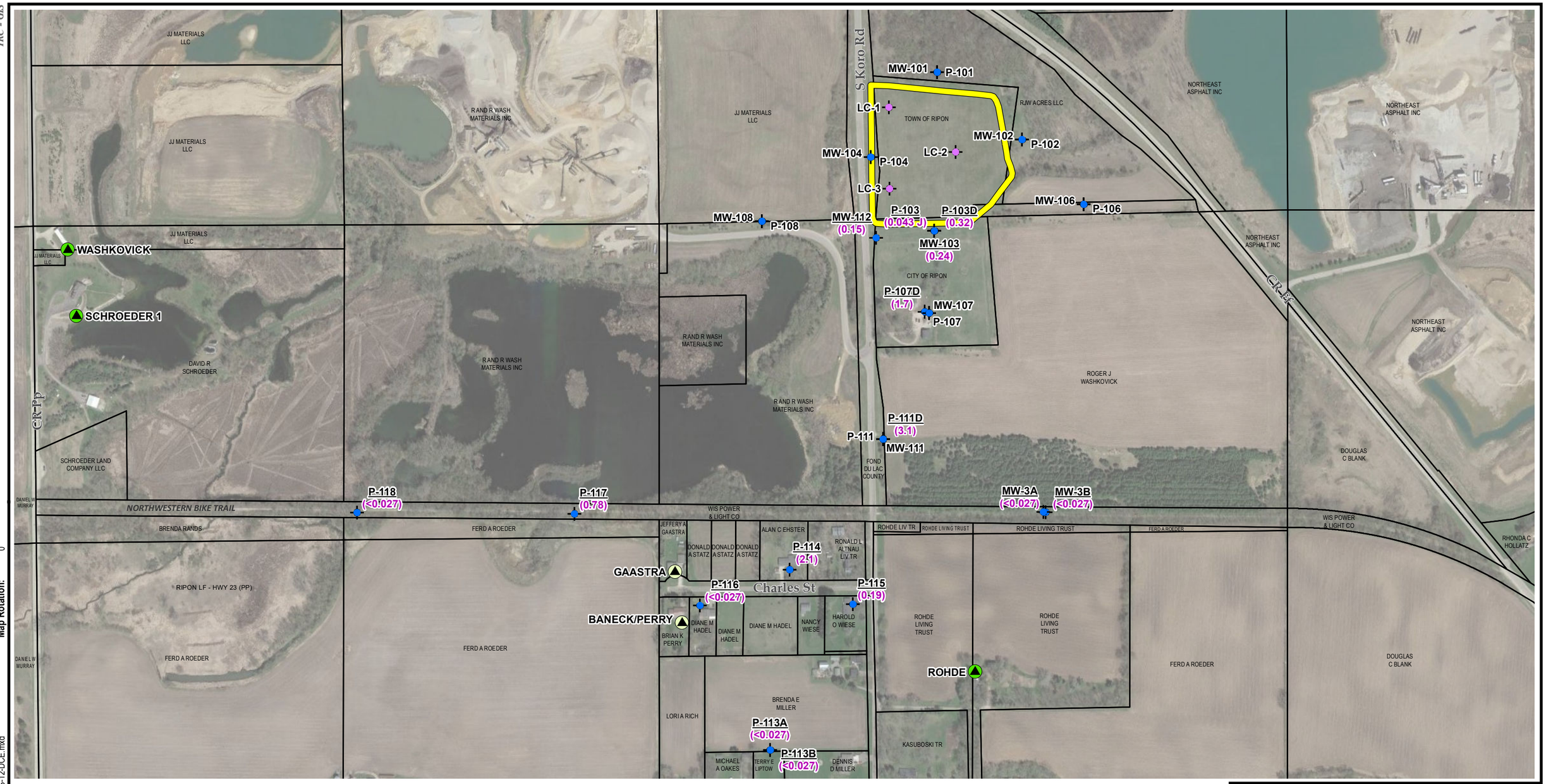
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0

TRC - GIS



LEGEND

- LEACHATE HEAD WELL
- MONITORING WELL, PIEZOMETER LOCATION
- PRIVATE WELL USED FOR POTABLE PURPOSES
- PRIVATE WELL NOT USED FOR POTABLE PURPOSES
- APPROXIMATE EXTENT OF RIPON FF/NN LANDFILL
- (3.1) CIS-1,2-DCE CONCENTRATION (µg/L)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE, (4/21/2017).

0 400 800 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
THIRD QUARTER 2020 REPORTING

TITLE:
CIS-1,2-DCE RESULTS MAP, JULY 13 AND 14, 2020

DRAWN BY:	R. SUEMNICHT	PROJ. NO.:	421748
CHECKED BY:	L. AUNER		
APPROVED BY:	S. SELLWOOD		**FIGURE 5**
DATE:	FEBRUARY 2021		

TRC
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FILE NO.: 421748-2020-Q3-002-CIS-12-DCE.mxd

Plot Date: 2/23/2021, 09:43:30 AM by RSUEMNICHT -- LAYOUT: ANSI B(11"x17")
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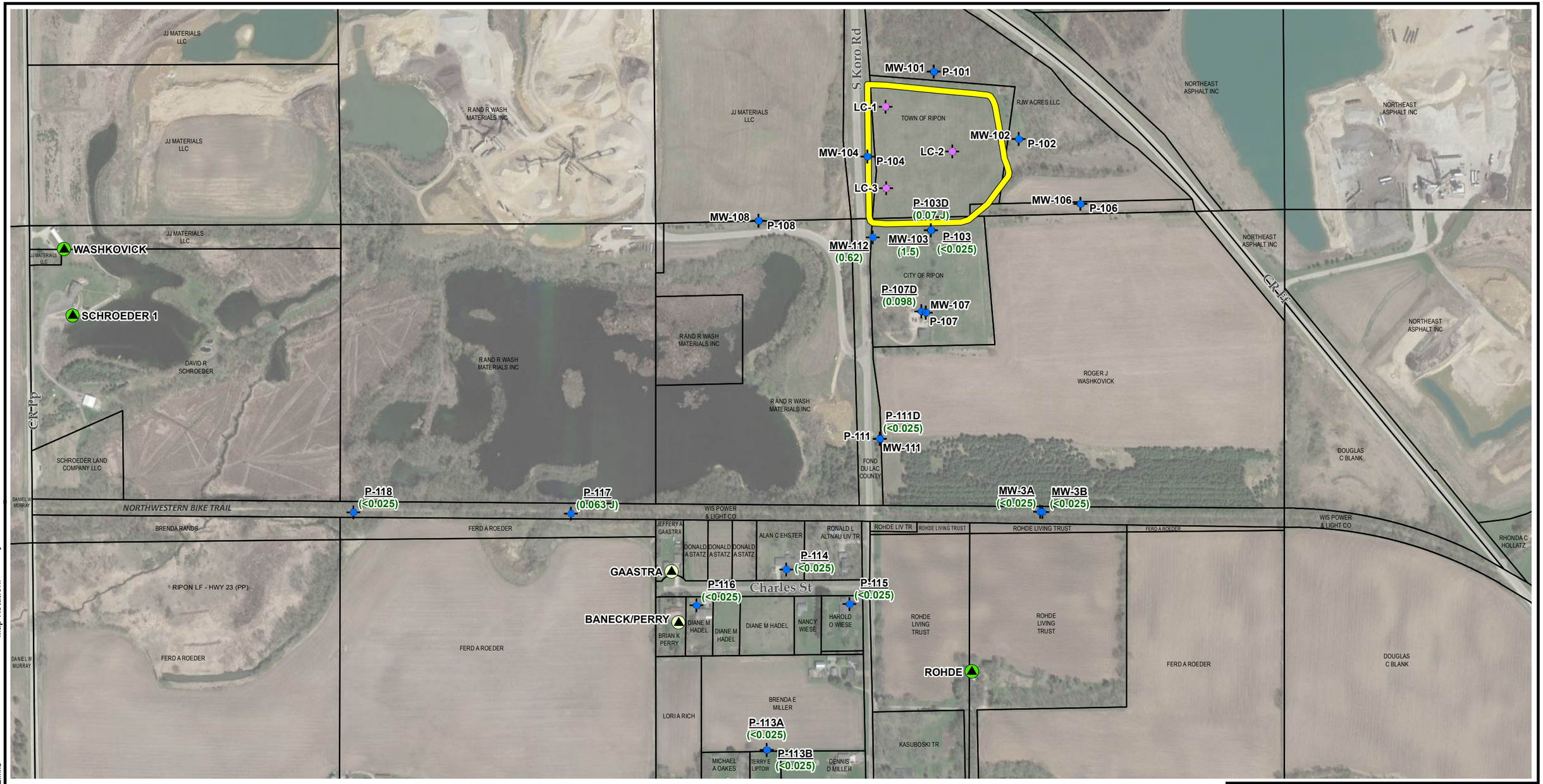
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0
TRC - GIS



LEGEND

- LEACHATE HEAD WELL
- MONITORING WELL, PIEZOMETER LOCATION
- PRIVATE WELL USED FOR POTABLE PURPOSES
- PRIVATE WELL NOT USED FOR POTABLE PURPOSES
- APPROXIMATE EXTENT OF RIPON FF/NN LANDFILL
- (1.5) TCE CONCENTRATION (µg/L)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE, (4/21/2017).

0 400 800 Feet

1 " = 400 '

1:4,800

PROJECT:
FF/NN LANDFILL NPL SITE
RIPON, WI
THIRD QUARTER 2020 REPORTING

TITLE:
TCE RESULTS MAP, JULY 13 AND 14, 2020

DRAWN BY:	R. SUEMNICHT	PROJ. NO.:	421748
CHECKED BY:	L. AUNER		
APPROVED BY:	S. SELLWOOD		**FIGURE 4**
DATE:	FEBRUARY 2021		

TRC
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Phone: 262.879.1212
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FILE NO.: 421748-2020-Q3-001-TCE.mxd

Plot Date: 2/22/2021, 14:04:22 PM by RSUEMNICHT -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Ripon\421748-2020-Q3-001-TCE.mxd
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0

TRC - GIS

Table 3: Detected Parameters in Groundwater
FF/NN Landfill
Ripon, Wisconsin
First Quarter 2020

Parameter	Units	NR140 ES	NR 140 PAL	MW-003A 2/25/2020 391698	MW-003A Dup 2/25/2020 391700	MW-003B 2/25/2020 391699	P-103D 2/26/2020 391697	P-107D 2/25/2020 391696	P-111D 2/25/2020 391695	P-113A 2/26/2020 391687
Field Parameters										
Depth to water	Feet			27.98		28.48	49.56	49.57	34.11	14.41
Water elevation	Feet			822.62		822.41	823.35	822.33	821.45	818.75
pH, field	SU			7.43		7.70	7.37	7.44	7.45	7.42
Conductance, specific	µmhos/cm			582.8		678.0	812.1	612.2	927.2	578.3
ORP	mV			-146.1		-209.3	-115.6	-121.4	-136.2	-8.1
Oxygen, dissolved	mg/L			0.18		0.08	0.31	1.31	0.17	0.67
Turbidity, field				NONE		NONE	NONE	NONE	NONE	NONE
Temperature	Deg C			8.49		8.56	8.29	7.42	8.62	8.59
Color, field				NONE		NONE	NONE	NONE	NONE	NONE
Odor, field				NONE		SL SULF	NONE	NONE	NONE	NONE
Inorganic Analytes										
Nitrogen, nitrate + nitrite, total	mg/L	10	2	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057
Sulfate, total	mg/L	250	125	20	21	49	71	25	59	12
Manganese, total	µg/L	50	25	**456**	**450**	**74**	**80.4**	**189**	*34.2*	21.8
Organic Analytes										
Benzene	µg/L	5	0.5	< 0.019	< 0.019	< 0.019	0.022 J	< 0.019	< 0.019	< 0.019
Chloroethane	µg/L	400	80	< 0.023	< 0.023	< 0.023	< 0.023	0.45	0.89	< 0.023
Chloromethane	µg/L	30	3	0.084 Ju	0.083 Ju	0.073 Ju	0.082 Ju	0.053 Ju	0.11 u	0.037 Ju
cis-1,2-Dichloroethene	µg/L	70	7	< 0.027	< 0.027	< 0.027	0.25	0.66	2.8	< 0.027
Methylene chloride	µg/L	5	0.5	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	µg/L	100	10	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022
Toluene	µg/L	800	160	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
trans-1,2-dichloroethene	µg/L	100	20	< 0.029	< 0.029	< 0.029	< 0.029	< 0.029	0.035 J	< 0.029
Trichloroethene	µg/L	5	0.5	< 0.025	< 0.025	< 0.025	0.062 J	0.043 J	< 0.025	< 0.025
Vinyl chloride	µg/L	0.2	0.02	< 0.013	< 0.013	*0.035 J*	**0.22**	**2.1**	**3**	< 0.013

Notes:

1. µg/l = micrograms per liter (ppb).
2. SU = Standard Units
3. µmhos/cm = microSiemens per centimeter
4. Deg C = Degrees Celsius
5. mV = millivolts
6. mg/L = milligrams per liter (ppm).
7. Metals analyzed using EPA Method 6010.
8. NR 140 ES = Wisconsin Administrative Code Chapter NR 140 Enforcement Standard.
9. NR 140 PAL = Wisconsin Administrative Code Chapter NR 140 Preventive Action Limit.
10. **BOLD** = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC ES.
11. *Italics* = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC PAL.
12. ORP - Oxidation Reduction Potential
13. J = Reported concentration is estimated, between the Limit of Detection (LOD) and the Limit Of Quantitation (LOQ)
14. u = Result is noted in the method blank and the trip blank and the concentration was flagged during data review as undetected.

Table 3: Detected Parameters in Groundwater
FF/NN Landfill
Ripon, Wisconsin
Second Quarter 2020

Parameter	Units	NR140 ES	NR 140 PAL	MW-003A 4/27/2020 413612	MW-003B 4/27/2020 413611	MW-101 4/27/2020 WL2004-X02	MW-102 4/27/2020 WL2004-X03	MW-103 4/28/2020 413613	MW-104 4/28/2020 413631	MW-106 4/27/2020 WL2004-X06	MW-107 4/28/2020 413616	MW-108 4/27/2020 WL2004-X08	MW-111 4/27/2020 WL2004-X09	MW-112 4/28/2020 413623	P-101 4/27/2020 WL2004-X11	P-102 4/27/2020 WL2004-X12	P-103 4/27/2020 413596	P-103D 4/27/2020 413609	P-104 4/27/2020 WL2004-X13
Field Parameters																			
Depth to water	Feet			29.16	28.63	59.88	17.76	49.32	50.19	49.32	50.07	25.57	36.23	53.68	60.46	17.62	48.05	49.02	50.67
Water elevation	Feet			821.44	822.26	824.85	825.14	822.98	825.01	829.43	821.62	819.51	819.86	821.02	824.93	825.23	824.69	823.89	824.73
Depth to bottom	Feet			280.1	185.72			53.69	54.9		55.29			60.47			83.02	192.66	
Bottom elevation	Feet			570.5	665.17			818.61	820.25		816.4			814.23			789.72	680.25	
pH, field	SU			7.56	7.54			6.71			7.10			7.17			7.18	7.13	
Conductance, specific	µmhos/cm			570.5	698.0			870.0	857.4		827.3			940.57			758.4	791.6	
ORP	mV			-33.9	-72.1			41.9	104.7		80.9			260.19			-10.7	-14.3	
Oxygen, dissolved	mg/L			1.65	0.21			11.39	3.43		11.77			3.81			1.01	1.06	
Turbidity, field	#N/A			SLIGHT	SLIGHT			SLIGHT	MOD		VERY			SLIGHT			SLIGHT	SLIGHT	
Temperature	Deg C			9.27	9.08			12.08	11.24		13.35			14.63			9.43	9.98	
Color, field	#N/A			NONE	NONE			LT GREY	LT GREY		BROWN			TAN			NONE	NONE	
Odor, field	#N/A			NONE	SULF			NONE	YES		NONE			NONE			NONE	NONE	
Inorganic Analytes																			
Nitrogen, nitrate + nitrite, total	mg/L	10	2	< 0.057	< 0.057			**24**	0.25		*3.5*			1.7			< 0.057	< 0.057	
Sulfate, total	mg/L	250	125	21	60			**140**	29		13			66			68	74	
Manganese, dissolved	µg/L	50	25	**435**	**79.9**			< 2.2	**100**		< 2.2			**311**			**95.6**	**80.9**	
Organic Analytes																			
1,1-Dichloroethane	µg/L	850	85	< 0.015	< 0.015			< 0.015	< 0.015		< 0.015			< 0.015			< 0.015	< 0.015	
1,2,4-Trimethylbenzene	µg/L			< 0.02	< 0.02			< 0.02	< 0.02		< 0.02			< 0.02			< 0.02	< 0.02	
1,4-Dichlorobenzene	µg/L	75	15	< 0.017	< 0.017			< 0.017	1.6		< 0.017			< 0.017			< 0.017	< 0.017	
Acetone	µg/L	9000	1800	< 0.8	< 0.8			1.1 Ju	1.5 Ju		< 0.8			0.93 Ju			< 0.8	< 0.8	
Benzene	µg/L	5	0.5	< 0.019	< 0.019			< 0.019	0.12		< 0.019			< 0.019			< 0.019	0.022 J	
Carbon disulfide	µg/L	1000	200	0.024 Ju	0.022 Ju			0.022 Ju	0.16		0.018 Ju			< 0.014			0.029 Ju	0.018 Ju	
Chlorobenzene	µg/L	100	20	< 0.015	< 0.015			< 0.015	3.7		< 0.015			0.047 J			< 0.015	< 0.015	
Chloroethane	µg/L	400	80	< 0.023	< 0.023			< 0.023	< 0.023		< 0.023			< 0.023			< 0.023	< 0.023	
cis-1,2-Dichloroethene	µg/L	70	7	< 0.027	< 0.027			0.24	0.094		< 0.027			0.16			0.04 J	0.26	
Dichlorodifluoromethane	µg/L	1000	200	< 0.03	< 0.03			< 0.03	< 0.03		< 0.03			0.032 J			< 0.03	< 0.03	
di-Isopropyl ether	µg/L			< 0.02	< 0.02			< 0.02	0.047 J		< 0.02			< 0.02			< 0.02	< 0.02	
Isopropylbenzene	µg/L			< 0.018	< 0.018			< 0.018	0.19		< 0.018			< 0.018			< 0.018	< 0.018	
Methylene chloride	µg/L	5	0.5	< 0.03	< 0.03			< 0.03	< 0.03		< 0.03			< 0.03			< 0.03	< 0.03	
Methyl-tert-butyl-ether	µg/L	60	12	< 0.017	< 0.017			< 0.017	0.068		< 0.017			< 0.017			< 0.017	< 0.017	
Naphthalene	µg/L	100	10	< 0.022	< 0.022			< 0.022	< 0.022		< 0.022			< 0.022			< 0.022	< 0.022	
sec-Butylbenzene	µg/L			< 0.014	< 0.014			< 0.014	0.065		< 0.014			< 0.014			< 0.014	< 0.014	
tert-Butylbenzene	µg/L			< 0.013	< 0.013			< 0.013	0.015 J		< 0.013			< 0.013			< 0.013	< 0.013	
Tetrachloroethene	µg/L	5	0.5	< 0.023	< 0.023			0.25	< 0.023		0.036 J			0.28			< 0.023	< 0.023	
Tetrahydrofuran	µg/L	50	10	< 0.28	< 0.28			< 0.28	< 0.28		< 0.28			< 0.28			< 0.28	< 0.28	
Toluene	µg/L	800	160	< 0.017	< 0.017			< 0.017	0.024 J		< 0.017			< 0.017			< 0.017	< 0.017	
trans-1,2-dichloroethene	µg/L	100	20	< 0.029	< 0.029			< 0.029	< 0.029		< 0.029			< 0.029			< 0.029	< 0.029	
Trichloroethene	µg/L	5	0.5	< 0.025	< 0.025			*1.4*	0.041 J		0.029 J			*1*			0.035 J	0.054 J	
Vinyl chloride	µg/L	0.2	0.02	< 0.013	< 0.013			< 0.013	< 0.013		< 0.013			*0.025 J*			*0.027 J*	**0.25**	
Xylene, M + P	µg/L			< 0.03	< 0.03			< 0.03	0.032 J		< 0.03			< 0.03			< 0.03	< 0.03	

Notes:

1. µg/l = micrograms per liter (ppb).
2. SU = Standard Units
3. µmhos/cm = microSiemens per centimeter
4. Deg C = Degrees Celsius
5. mV = millivolts
6. mg/L = milligrams per liter (ppm).
7. Metals analyzed using EPA Method 6010.
8. NR 140 ES = Wisconsin Administrative Code Chapter NR 140 Enforcement Standard.
9. NR 140 PAL = Wisconsin Administrative Code Chapter NR 140 Preventive Action Limit.
10. **BOLD** = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC ES.
11. *Italics* = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC PAL.
12. ORP - Oxidation Reduction Potential
13. J = Reported concentration is estimated, between the Limit of Detection (LOD) and the Limit Of Quantitation (LOQ)
14. u = Result is noted in the method blank and the trip blank and the concentration was flagged during data review as undetected.

Table 3: Detected Parameters in Groundwater
FF/NN Landfill
Ripon, Wisconsin
Second Quarter 2020

Parameter	Units	NR140 ES	NR 140 PAL	P-106 4/27/2020 413608	P-107 4/28/2020 413617	P-107D 4/28/2020 413632	P-108 4/27/2020 WL2004-X16	P-111 4/27/2020 WL2004-X17	P-111D 4/28/2020 413622	P-111D DUP 4/28/2020 413628	P-113A 4/27/2020 413630	P-113B 4/27/2020 413607	P-114 4/27/2020 413619	P-114 DUP 4/27/2020 413629	P-115 (Wiese) 4/27/2020 413610	P-116 (Hadel) 4/27/2020 413618	P-117 4/27/2020 413620	P-118 4/27/2020 413621	Rhode 4/28/2020 413614	Trip Blank 4/28/2020 413633
Field Parameters																				
Depth to water	Feet			53.71	49.65	49.97	23.37	36.29	33.89		11.71	11.95	18.51		21.71	25.61	14.50	7.33		
Water elevation	Feet			825.09	821.68	821.93	822.11	819.99	821.67		821.45	821.21	820.85		820.96	820.25	819.46	819.41		
Depth to bottom	Feet			87.3	87.13	322.9			148.46		325.31	181.72			179.57	163.19	165.54	167.44		
Bottom elevation	Feet			791.61	784.2	549			707.1		507.85	651.44			663.1	682.67	668.42	659.3		
pH, field	SU			7.08	7.27	7.43			7.53		7.32	6.56	7.60		7.39	7.61	7.48	7.70	6.98	
Conductance, specific	µmhos/cm			685.3	844.9	601.8			876.31		559.23	686.3	800.84		645.2	532.23	760.22	597.14	434.2	
ORP	mV			-1.20	10.50	-1.8			-40.1		30.2	16.5	-18.7		-60.7	21.6	-17.9	-15.9	8.9	
Oxygen, dissolved	mg/L			1.76	0.50	2.82			0.81		1.44	0.31	0.24		0.33	0.50	0.70	0.47	1.86	
Turbidity, field	#N/A			SLIGHT	SLIGHT	NONE			SLIGHT		SLIGHT	SLIGHT	SLIGHT		SLIGHT	VERY	SLIGHT	SLIGHT	NONE	
Temperature	Deg C			10.5	10.58	10.64			10.44		9.70	9.35	9.69		9.41	9.55	9.66	9.49	12.22	
Color, field	#N/A			NONE	NONE	NONE			NONE		NONE	NONE	NONE		NONE	RUST	NONE	NONE	NONE	
Odor, field	#N/A			SL SULF	NONE	NONE			NONE		NONE	SL SULF	SULF		NONE	NONE	NONE	NONE	NONE	
Inorganic Analytes																				
Nitrogen, nitrate + nitrite, total	mg/L	10	2	< 0.057	< 0.057	< 0.057			< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	< 0.057	
Sulfate, total	mg/L	250	125	85	92	28			59	64	11	77	60	63	43	14	57	23	23	
Manganese, dissolved	µg/L	50	25	**59.2**	**96.7**	**192**			*35.2*	*34.9*	12.3	*38*	**64.8**	**66.1**	**114**	**78.4**	**209**	**89.8**	**98.7**	
Organic Analytes																				
1,1-Dichloroethane	µg/L	850	85	< 0.015	< 0.015	< 0.015			< 0.015	0.017 J	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.28	< 0.015
1,2,4-Trimethylbenzene	µg/L			< 0.02	< 0.02	0.021 J			< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.3	< 0.02
1,4-Dichlorobenzene	µg/L	75	15	< 0.017	< 0.017	< 0.017			< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.29	< 0.017
Acetone	µg/L	9000	1800	< 0.8	< 0.8	< 0.8			< 0.8	< 0.8	< 0.8	0.93 Ju	0.84 Ju	< 0.8	0.93 Ju	< 0.8	< 0.8	< 0.8		1.3 J
Benzene	µg/L	5	0.5	< 0.019	0.021 J	< 0.019			< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	0.024 J	< 0.019	< 0.26	< 0.019
Carbon disulfide	µg/L	1000	200	0.021 Ju	0.019 Ju	0.044 Ju			0.026 Ju	0.022 Ju	0.017 Ju	0.019 Ju	0.024 Ju	0.029 Ju	0.052 u	0.039 Ju	0.019 Ju	0.023 Ju		< 0.014
Chlorobenzene	µg/L	100	20	< 0.015	< 0.015	< 0.015			< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.25	< 0.015
Chloroethane	µg/L	400	80	< 0.023	0.21	< 0.023			1.5	1.4	< 0.023	< 0.023	0.52	< 0.023	< 0.023	< 0.023	0.55	< 0.023	< 0.3	< 0.023
cis-1,2-Dichloroethene	µg/L	70	7	0.059 J	0.26	0.81			3.3	3.2	< 0.027	< 0.027	2.1	2.2	0.19	< 0.027	0.77	< 0.027	< 0.28	< 0.027
Dichlorodifluoromethane	µg/L	1000	200	< 0.03	0.035 J	< 0.03			0.052 J	0.073 J	< 0.03	< 0.03	0.047 J	0.061 J	< 0.03	< 0.03	< 0.03	< 0.03	< 0.3	< 0.03
di-Isopropyl ether	µg/L			< 0.02	< 0.02	< 0.02			< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		< 0.02
Isopropylbenzene	µg/L			< 0.018	< 0.018	< 0.018			< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.29	< 0.018
Methylene chloride	µg/L	5	0.5	< 0.03	< 0.03	< 0.03			< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.3	*0.92*
Methyl-tert-butyl-ether	µg/L	60	12	< 0.017	< 0.017	< 0.017			< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.26	< 0.017
Naphthalene	µg/L	100	10	< 0.022	< 0.022	< 0.022			< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	0.025 J	< 0.022	< 0.5	< 0.022
sec-Butylbenzene	µg/L			< 0.014	< 0.014	< 0.014			< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.26	< 0.014
tert-Butylbenzene	µg/L			< 0.013	< 0.013	< 0.013			< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.24	< 0.013
Tetrachloroethene	µg/L	5	0.5	< 0.023	< 0.023	< 0.023			< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.26	< 0.023
Tetrahydrofuran	µg/L	50	10	< 0.28	< 0.28	< 0.28			< 0.28	0.51 J	< 0.28	< 0.28	0.63 J	0.63 J	< 0.28	< 0.28	< 0.28	< 0.28		< 0.28
Toluene	µg/L	800	160	< 0.017	< 0.017	< 0.017			< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	0.033 J	< 0.25	< 0.017
trans-1,2-dichloroethene	µg/L	100	20	< 0.029	< 0.029	< 0.029			0.042 J	0.044 J	< 0.029	< 0.029	0.036 J	0.038 J	< 0.029	< 0.029	< 0.029	< 0.029	< 0.23	< 0.029
Trichloroethene	µg/L	5	0.5	0.14	0.065 J	0.037 J			< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.046 J	< 0.025	< 0.3	< 0.025
Vinyl chloride	µg/L	0.2	0.02	< 0.013	**0.84**	**2.8**			**3.6**	**3.5**	< 0.013	< 0.013	**7.7**	**7.9**	**0.83**	< 0.013	**1.2**	*0.047*	< 0.17	< 0.013
Xylene, M + P	µg/L			< 0.03	< 0.03	< 0.03			< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		< 0.03

Notes:

1. µg/l = micrograms per liter (ppb).
2. SU = Standard Units
3. µmhos/cm = microSiemens per centimeter
4. Deg C = Degrees Celsius
5. mV = millivolts
6. mg/L = milligrams per liter (ppm).
7. Metals analyzed using EPA Method 6010.
8. NR 140 ES = Wisconsin Administrative Code Chapter NR 140 Enforcement Standard.
9. NR 140 PAL = Wisconsin Administrative Code Chapter NR 140 Preventive Action Limit.
10. **BOLD** = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC ES.
11. *Italics* = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC PAL.
12. ORP - Oxidation Reduction Potential
13. J = Reported concentration is estimated, between the Limit of Detection (LOD) and the Limit Of Quantitation (LOQ)
14. u = Result is noted in the method blank and the trip blank and the concentration was flagged during data review as undetected.

Created by: P. Popp
Reviewed by: A. Sobbe

Table 3: Detected Parameters in Groundwater
FF/NN Landfill
Ripon, Wisconsin
Third Quarter 2020

Parameter	Units	NR140 ES	NR 140 PAL	MW-003A 7/13/2020 445412	MW-003B 7/13/2020 445413	MW-103 7/14/2020 445422	MW-112 7/14/2020 445419	P-103 7/14/2020 445421	P-103D 7/14/2020 445420	P-107D 7/14/2020 445418	P-111D 7/13/2020 445416	P-113A 7/13/2020 445408	P-113B 7/13/2020 445402	P-114 7/13/2020 445410	P-114 DUP 7/13/2020 445417	P-115 (Wiese) 7/13/2020 445411	P-116 (Hadel) 7/13/2020 445409	P-117 7/13/2020 445414	P-118 7/13/2020 445415	Trip Blank 7/14/2020 445425
Field Parameters																				
Depth to water	Feet			30.35	29.23	49.03	52.38	47.88	49.10	51.10	34.14	12.63	12.39	18.82		22.12	25.79	14.71	7.59	
Water elevation	Feet			820.25	821.66	823.27	822.32	824.86	823.81	820.8	821.42	820.53	820.77	820.54		820.55	820.07	819.25	819.15	
pH, field	SU			7.41	7.39	7.11	6.94	7.02	6.97	6.56	7.34	6.67	6.37	7.27		7.46	7.31	7.32	7.37	
Conductance, specific	µmhos/cm			627.0	769.5	873.8	749.7	748.0	790.4	623.12	958.0	619.6	747.3	874.8		706.4	588.3	840.9	656.5	
ORP	mV			-9.8	-63.7	-12.6	94.8	-2.7	18.0	82.3	-67.4	8.3	8.70	-15.80		-37.6	16.3	-36.9	-39.7	
Oxygen, dissolved	mg/L			0.16 j	0.13 j	5.98 j	3.67 j	0.52 j	0.2 j	1.67 j	0.60 j	0.39 j	0.19 j	0.13 j		0.14 j	0.32 j	0.20 j	0.23 j	
Turbidity, field				NONE	NONE	SLIGHT	SLIGHT	NONE	NONE	NONE	NONE	NONE	NONE	NONE		SLIGHT	VERY	NONE	NONE	
Temperature	Deg C			11.52	11.79	15.67	14.27	12.72	12.22	11.20	12.42	12.03	12.35	11.41		11.72	12.81	11.47	12.17	
Color, field				NONE	NONE	NONE	YES	NONE	NONE	NONE	NONE	NONE	NONE	NONE		NONE	RUST	NONE	NONE	
Odor, field				NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	LT SULF		LT SULF	NONE	NONE	NONE	
Inorganic Analytes																				
Nitrogen, nitrate + nitrite, total	mg/L	10	2	< 0.057 j-	< 0.057 j-	**19 j-**	1.5 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	< 0.057 j-	
Sulfate, total	mg/L	250	125	21	58	120	64	65	73	30	59	12	74	66	66	37	13	58	25	
Manganese, dissolved	µg/L	50	25	**413**	**76.7**	< 2.2	**358**	**85.8**	**78.8**	**186**	*30.3*	18.5	*34.5*	**61.8**	**61.6**	**107**	**72.2**	**198**	**63.1**	
Organic Analytes																				
1,4-Dioxane	µg/L	3	0.3	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	**13 J**
Benzene	µg/L	5	0.5	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	0.029 J	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	0.022 J	< 0.019	< 0.019
Carbon disulfide	µg/L	1000	200	0.025 JBu	0.043 JBu	< 0.014	< 0.014	< 0.014	< 0.014	0.024 Ju	0.021 JBu	0.031 Ju	0.019 JBu	0.019 JBu	0.018 Ju	0.032 JBu	0.018 Ju	0.034 JBu	< 0.014	0.021 J
Chlorobenzene	µg/L	100	20	< 0.015	< 0.015	< 0.015	0.068	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Chloroethane	µg/L	400	80	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	2.6	1.6	< 0.023	< 0.023	0.34	0.54	< 0.023	< 0.023	0.72	< 0.023	< 0.023
Chloromethane	µg/L	30	3	0.046 JBu	0.037 JBu	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.037 Ju	0.033 JBu	0.044 JBu	< 0.03	0.041 JBu	< 0.03	0.04 JBu	0.052 JBu	0.037 J
cis-1,2-Dichloroethene	µg/L	70	7	< 0.027	< 0.027	0.24	0.15	0.043 J	0.32	1.7	3.1	< 0.027	< 0.027	2	2.1	0.19	< 0.027	0.78	< 0.027	< 0.027
Dichlorodifluoromethane	µg/L	1000	200	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.067 J	0.058 J	< 0.03	< 0.03	0.04 J	0.067 J	< 0.03	< 0.03	0.041 J	< 0.03	< 0.03
Methylene chloride	µg/L	5	0.5	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	*1.2 j+*
Tetrachloroethene	µg/L	5	0.5	< 0.023	< 0.023	0.24	0.24	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023
Toluene	µg/L	800	160	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	0.023 J	< 0.017
Trichloroethene	µg/L	5	0.5	< 0.025	< 0.025	*1.5*	*0.62*	< 0.025	0.07 J	0.098	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.063 J	< 0.025	< 0.025
Vinyl chloride	µg/L	0.2	0.02	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	**0.3**	**5.8**	**3.7**	< 0.013	< 0.013	**7.7**	**8**	**0.85**	< 0.013	**1.4**	< 0.013	< 0.013

Notes:

1. µg/l = micrograms per liter (ppb).
2. SU = Standard Units
3. µmhos/cm = microSiemens per centimeter
4. Deg C = Degrees Celsius
5. mV = millivolts
6. mg/L = milligrams per liter (ppm).
7. ORP - Oxidation Reduction Potential
8. Metals analyzed using EPA Method 6010.
9. NR 140 ES = Wisconsin Administrative Code Chapter NR 140 Enforcement Standard.
10. NR 140 PAL = Wisconsin Administrative Code Chapter NR 140 Preventive Action Limit.
11. **BOLD** = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC ES.
12. *Italics* = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC PAL.
13. J = Reported concentration is estimated, between the Limit of Detection (LOD) and the Limit Of Quantitation (LOQ).
14. j+ = Reported concentration is estimated with a possible high bias.
15. j- = Reported concentration is estimated with a possible low bias.
16. j = DO cap on instrument expired, could not calibrate.
17. B = Analyte detected in the associated Method Blank.
18. u = Result is noted in an associated blank and the concentration was flagged during data review as non-detect.

Created by: P. Popp 8/4/2020
Checked by: A. Sobbe 12/18/2020

Table 5: Detected Parameters in Groundwater - Fourth Quarter 2020
FF/NN Landfill
Ripon, Wisconsin

Parameter	Units	NR 140 ES	NR 140 PAL	MW-003A 10/29/2020 496519	MW-003B 10/29/2020 496518	P-103D 10/28/2020 496509	P-107D 10/29/2020 496516	P-111D 10/29/2020 496515	P-113A 10/28/2020 496510	P-113B 10/28/2020 496511	P-114 10/28/2020 496512	P-114 DUP 10/28/2020 496514	P-115 (Wiese) 10/28/2020 496513	P-116 (Hadel) 10/29/2020 496517	P-117 10/29/2020 496520	P-118 10/29/2020 496521	Trip Blank 10/29/2020 496522
Field Parameters																	
Depth to water	Feet			31.03	30.71	49.81	51.94	34.80	13.68	13.45	19.41		22.65	26.53	15.20	8.05	
Water elevation	Feet			819.57	820.18	823.1	819.96	820.76	819.48	819.71	819.95		820.02	819.33	818.76	818.69	
pH, field	SU			7.74	7.88	7.59	7.68	7.81	7.66	7.78	7.79		7.86	7.95	7.74	7.91	
Conductance, specific	µmhos/cm			573.7	715	810	644.7	895	569.7	689	812		642.6	544.4	796	608.9	
ORP	mV			-156.5	-245.2	-177.3	-109.2	-173.2	-100.4	-182.4	-186.6		-188.2	-40.4	-180.2	-184.0	
Oxygen, dissolved	mg/L			0.21	0.21	0.95	2.09	0.38	1.01	0.26	0.28		0.21	0.93	0.24	0.24	
Turbidity, field				NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE		NONE	SLIGHT	NONE	NONE	
Temperature	Deg C			9.3	9.3	9.9	9.5	9.2	11.0	11.1	10.4		10.5	10.0	10.5	10.5	
Color, field				NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE		NONE	LT RUST	NONE	NONE	
Odor, field				NONE	SLT SULF	NONE	NONE	NONE	NONE	NONE	NONE		NONE	NONE	NONE	NONE	
Inorganic Analytes																	
Sulfate, total	mg/L	250	125	19	60	67	30	54	12	71	65	63	35	13	54	23	
Manganese, dissolved	µg/L	50	25	**476**	**82.2**	**93.5**	**226**	*33.8*	12.9	*39.5*	**69.2**	**70.1**	**124**	**90.6**	**232**	**57.3**	
Organic Analytes																	
1,1-Dichloroethane	µg/L	850	85	< 0.017	< 0.017	< 0.017	0.025 J	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
Benzene	µg/L	5	0.5	< 0.022	< 0.022	0.025 J	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	0.028 J	< 0.022	< 0.022
Chloroethane	µg/L	400	80	< 0.40	< 0.40	< 0.40	2.9	1.1 J	< 0.40	< 0.40	0.43 J	0.63 J	< 0.40	< 0.40	0.59 J	< 0.40	< 0.4
Chloroform	µg/L	6	0.6	< 0.016	0.018 J	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016
Chloromethane	µg/L	30	3	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	0.054 Ju	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	0.051 J
cis-1,2-Dichloroethene	µg/L	70	7	< 0.023	0.029 J	0.33	2.3	3.4	< 0.023	< 0.023	2.0	2.0	0.20	< 0.023	0.79	< 0.023	< 0.023
Methylene chloride	µg/L	5	0.5	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	0.46
Tetrahydrofuran	µg/L	50	10	< 0.38	< 0.38	< 0.38	0.84 J	< 0.38	< 0.38	< 0.38	0.64 J	0.70 J	< 0.38	< 0.38	< 0.38	< 0.38	< 0.38
Toluene	µg/L	800	160	0.052 Ju	< 0.014	0.021 Ju	0.024 Ju	0.015 Ju	< 0.014	< 0.014	0.029 Ju	< 0.014	< 0.014	< 0.014	0.02 Ju	0.032 Ju	0.064 J
trans-1,2-Dichloroethene	µg/L	100	20	< 0.020	< 0.020	< 0.020	< 0.020	0.049 J	< 0.020	< 0.020	0.038 J	0.042 J	< 0.020	< 0.020	< 0.020	< 0.020	< 0.02
Trichloroethene	µg/L	5	0.5	< 0.022	< 0.022	0.073 J	0.13	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	0.065 J	< 0.022	< 0.022
Vinyl chloride	µg/L	0.2	0.02	< 0.019	*0.049 J*	**0.26**	**5.7**	**3.9**	< 0.019	< 0.019	**8.1**	**7.8**	**0.67**	< 0.019	**1.2**	*0.088 J*	< 0.019

Notes:

1. µg/l = micrograms per liter (ppb).
2. SU = Standard Units
3. µmhos/cm = microSiemens per centimeter
4. Deg C = Degrees Celsius
5. mV = millivolts
6. mg/L = milligrams per liter (ppm).
7. Metals analyzed using EPA Method 6010.
8. NR 140 ES = Wisconsin Administrative Code Chapter NR 140 Enforcement Standard.
9. NR 140 PAL = Wisconsin Administrative Code Chapter NR 140 Preventive Action Limit.
10. **BOLD** = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC ES.
11. *Italics* = Exceedence (or potential exceedence if J- or B-flagged) of the NR 140, WAC PAL.
12. ORP - Oxidation Reduction Potential
13. J = Reported concentration is estimated, between the Limit of Detection (LOD) and the Limit Of Quantitation (LOQ)
14. u = Result is noted in an associated blank and the concentration was flagged during data review as non-detect.

Updated by: A. Stehn, 2/9/2021
Checked by: P. Popp, 2/9/2021

NATURAL ATTENUATION DATA

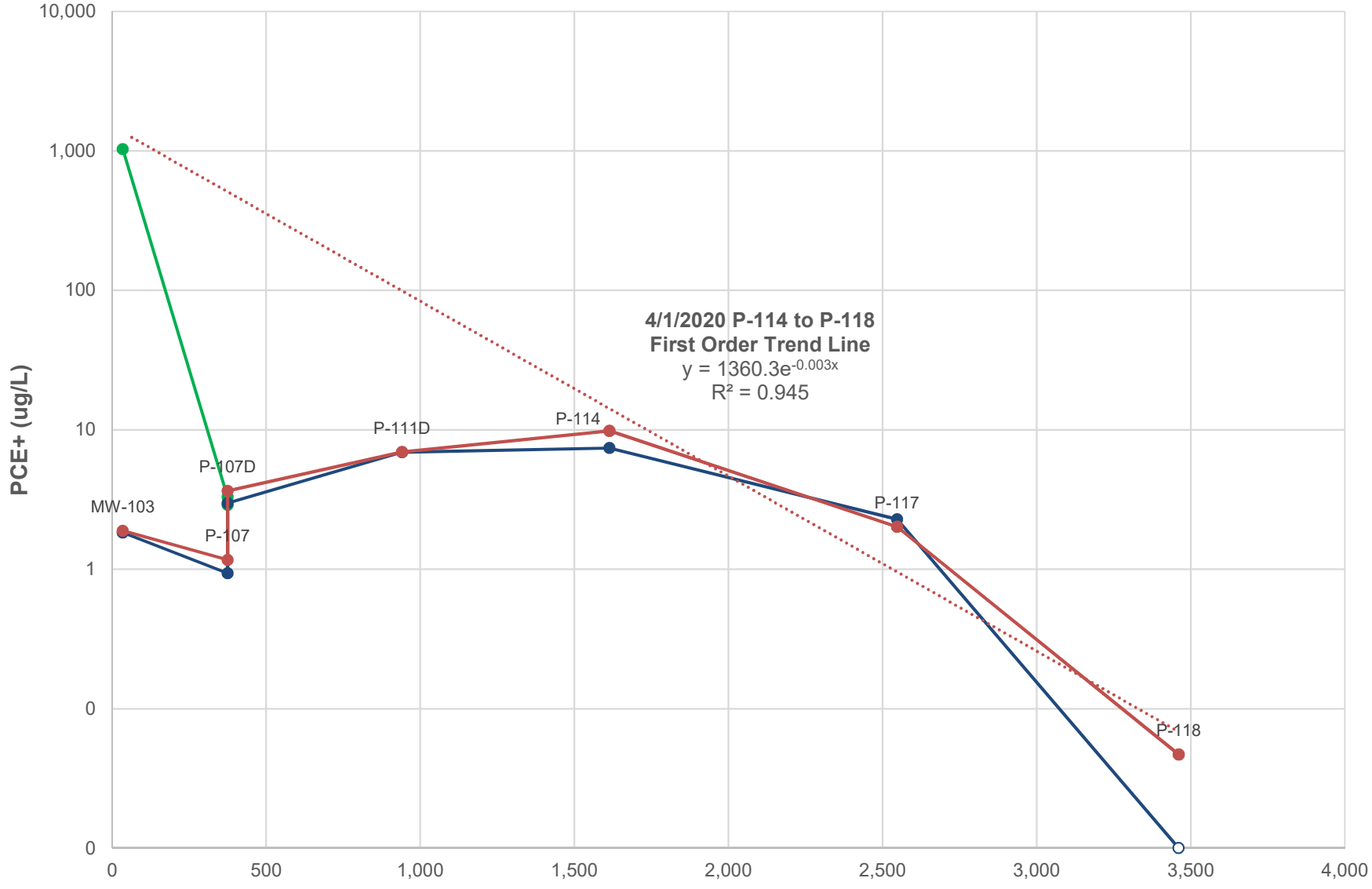
Table 8: Evaluation of Geochemical Conditions
FF/NN Landfill
Ripon, Wisconsin

Parameter	Screening Criteria	Upgradient Wells		Plume Centerline Wells							Conclusions/Notes
		MW-101 (background)	P-101 (background)	MW-103	P-107	P-107D	P-111D	P-114	P-117	P-118	
DO	<0.5 mg/L anaerobic degradation tolerated (EPA &WDNR), >5 mg/L anaerobic degradation not tolerated (EPA)	--	--	5.18-11.39 mg/L	0.5-0.6 mg/L	0.47-5.81 mg/L	0.13-1.2 mg/L	0.09-0.32 mg/L	0.2-0.72 mg/L	0.17-1.48 mg/L, <0.5 mg/L since May 2019	Low concentrations indicate the presence of anaerobic conditions in some wells. The higher DO concentrations are questionable based on other redox parameters.
ORP	<50 mV reductive pathway possible, <-100 mV reductive pathway likely (EPA & WDNR)	--	--	<50 mV	<50 mV	up to 80 mV	all <50 mV, some <-100 mV	all <50 mV, some <-100 mV	all <50 mV, some <-100 mV	all <50 mV, some <-100 mV	Reducing conditions present, supporting reductive dechlorination in most centerline wells.
Nitrate (including Nitrate+Nitrite)	<1 mg/L (EPA & WDNR) for nitrate	--	ND (<0.05 mg/L)	16-24 mg/L	ND (<0.06 mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25	Most data consistent with nitrate reducing conditions (except MW-103).
Mn, dissolved	WDNR: increase over background EPA: not specified *Concentrations >50 ug/L interpreted to indicate manganese-reducing conditions*	--	97 ug/L	ND (<2.2 ug/L)	>50 ug/L	>50 ug/L	30-35 ug/L	>50 ug/L	>50 ug/L	>50 ug/L	Manganese reducing likely in most centerline wells (not MW-103 or P-111D) based on concentrations >50 ug/L.
Fe, dissolved	WDNR: increase over background EPA: Iron(II) > 1 mg/L	--	--	--	--	--	0.49 mg/L	--	--	--	Older data from private wells supports iron reduction, but recent data from centerline wells not available.
Sulfate	WDNR: decrease over background EPA: <20 mg/L	--	~50 mg/L in 2002-2003	120-150 mg/L	66-92 mg/L	19-31 mg/L	54-65 mg/L	49-66 mg/L	54-66 mg/L	22-25 mg/L	Some evidence that sulfate reduction is occurring, but does not appear to be strong or widespread.
Methane	WDNR: Presence indicates methanogenic conditions EPA: <500 ug/L VC may oxidize >500 ug/L VC may accumulate	13-19 ug/L	ND (<0.93 or <10 ug/L)	ND (<0.93 ug/L)	110-383 ug/L	ND-163 ug/L	123-310 ug/L	138-285 ug/L	--	--	Methane present in centerline wells except MW-103 (ND), indicates the presence of methanogenic conditions in some areas of the aquifer.

Note: geochemical data are summarized for the history of monitoring at individual wells. Dates and number of samples vary by well.
-- = Not analyzed or measured
weak evidence for reductive pathway or reducing conditions
evidence that reductive pathway possible or reducing conditions present

Prepared by: L. Auner, 2/9/2021
Data checked by: B. Wachholz, 2/9/2021
Interpretation checked by: K. Quinn 2/11/2021

Figure 12
PCE+ Concentration vs. Distance Along Plume Centerline



Nondetect PCE+ results are represented with a hollow symbol at an arbitrary concentration of 0.01 ug/L for the purpose of graphing on a log plot.

\\madison-vfp\Records\-\WPMSN\PJT2\421748\0000\000003\4217480000PH3-002_F12.xlsx

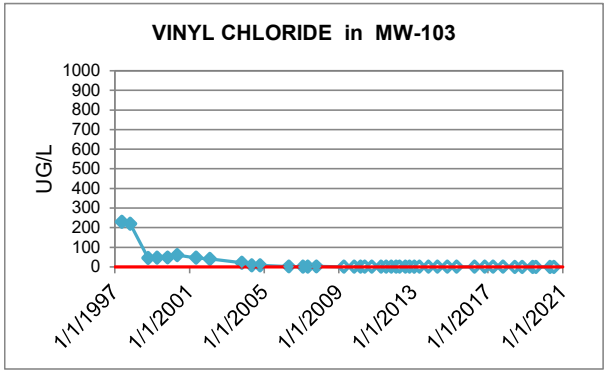
Table 5: VOC Concentration Mann-Kendall Trend Test Results
FF/NN Landfill
Ripon, Wisconsin
Second Quarter 2020

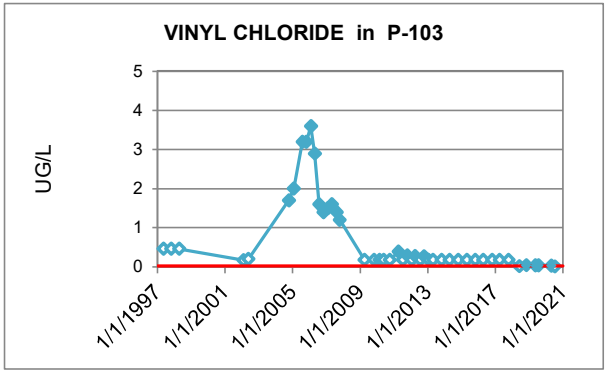
	Data Summary					Mann-Kendall Trend Test Results
	# Detections that Attain or Exceed NR 140 PAL	# Detections that Attain or Exceed NR 140 ES	# Detections	# Samples	% Detections	Confidence Coefficient = 0.95, Level of Significance = 0.05
TCE						
MW-103	41	3	42	42	100%	Decrease
MW-107	16	0	17	33	52%	Decrease
P-103D	0	0	9	51	18%	No trend (analysis of detections only, see Note 1)
P-107D	0	0	8	64	13%	No trend (analysis of detections only, see Note 1)
P-117	0	0	9	15	60%	No trend (analysis of detections only, see Note 1)
cis-1,2-DCE						
MW-103	15	8	42	42	100%	Decrease
P-103D	0	0	21	50	42%	Decrease
P-107	0	0	23	37	62%	Decrease
P-107D	0	0	44	63	70%	No trend
P-111D	0	0	55	61	90%	Increase, with maximum at less than 1/2 of PAL
P-114	0	0	55	58	95%	Increase, with maximum at less than 1/2 of PAL
P-117	0	0	14	14	100%	Decrease
VC						
MW-103	15	15	15	42	36%	Decrease
P-103	20	16	20	45	44%	Decrease
P-103D	34	32	34	51	67%	Decrease
P-107	31	31	31	37	84%	Decrease
P-107D	62	62	62	64	97%	No trend
P-111D	62	62	62	62	100%	Decrease
P-114	58	58	58	59	98%	No trend
P-117	15	15	15	15	100%	No trend
P-118	7	0	7	12	58%	No trend

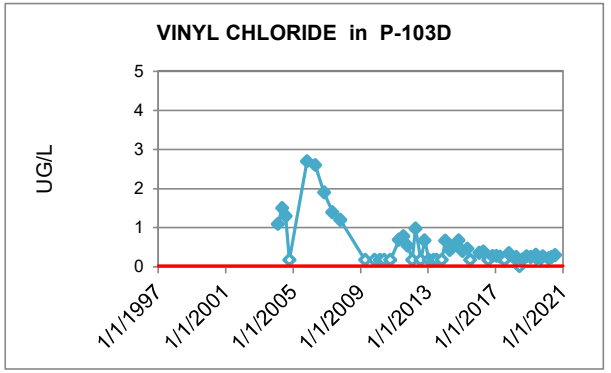
Notes:

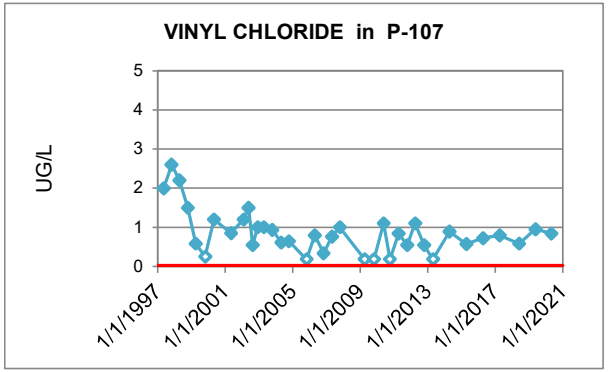
1. Trend analysis was completed for TCE, cis-1,2-DCE, and vinyl chloride data from plume centerline wells that had at least 50% detections or at least eight detections total for the given parameter over the monitoring history. Nondetect results were represented with the detection limit except for TCE data for P-103D, P-107D, and P-117, for which only detections were analyzed due early nondetect results with high detection limits.
2. No trend = insufficient statistical evidence of a significant trend at the specified level of significance.

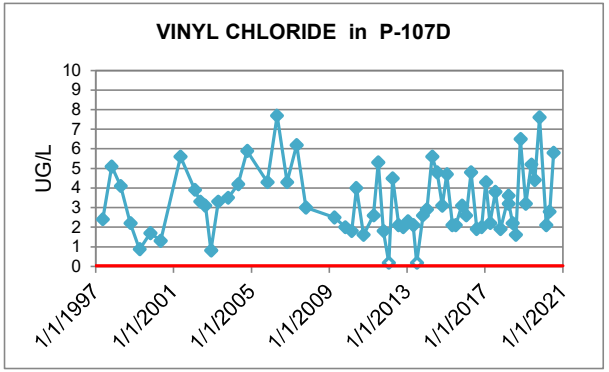
Updated by: L. Auner, 1/18/2021
Checked by: K. Quinn, 1/18/2021

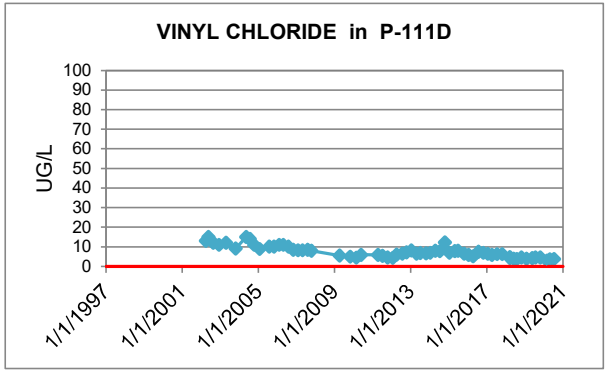


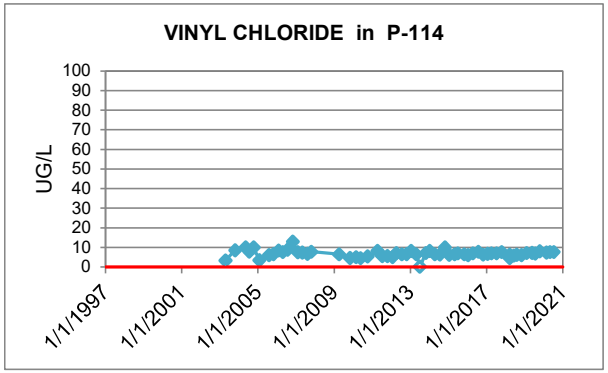


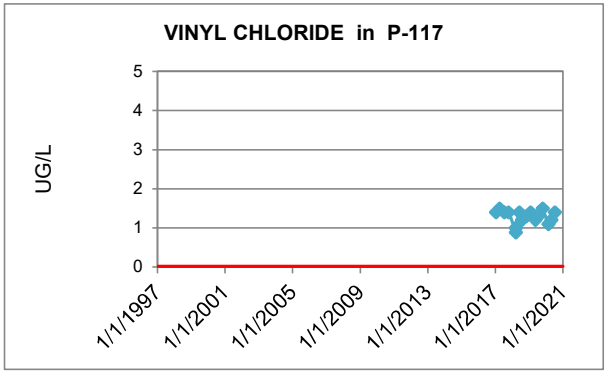


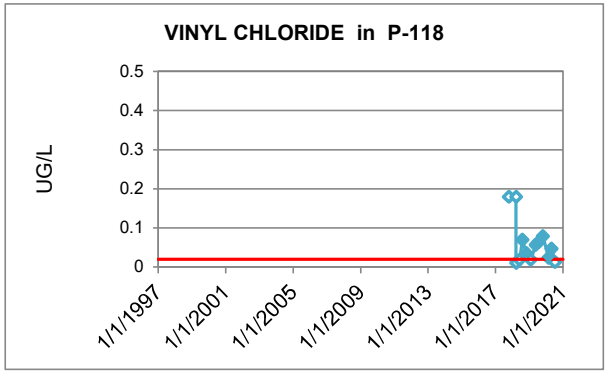








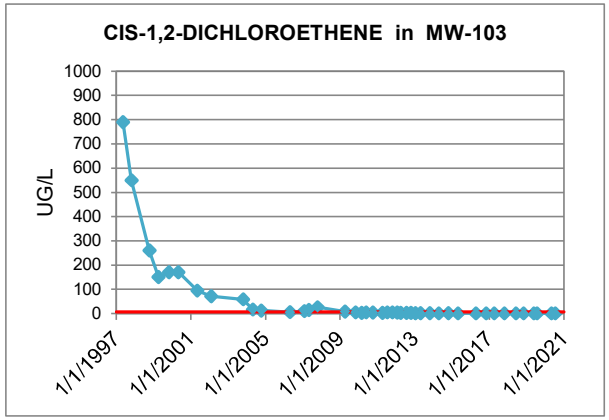


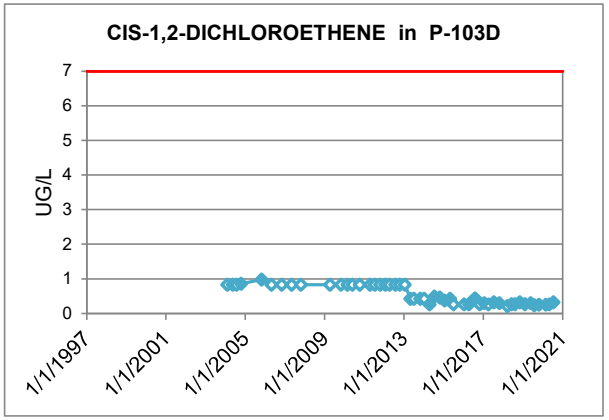


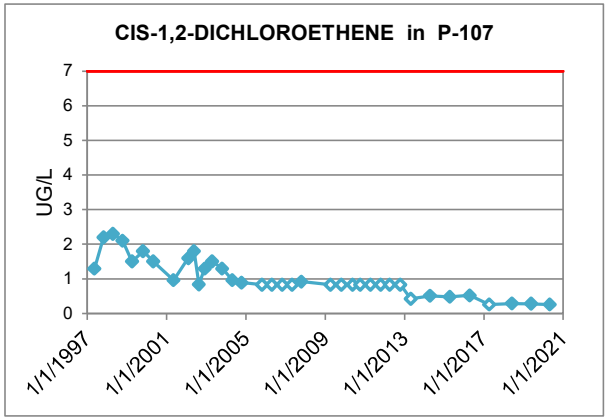
Notes:

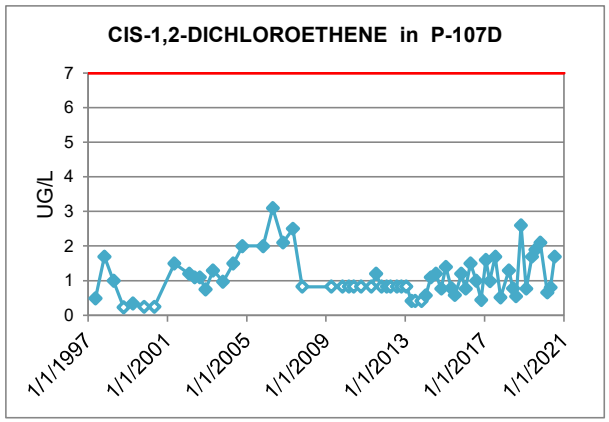
The red line represents the NR 140 PAL.

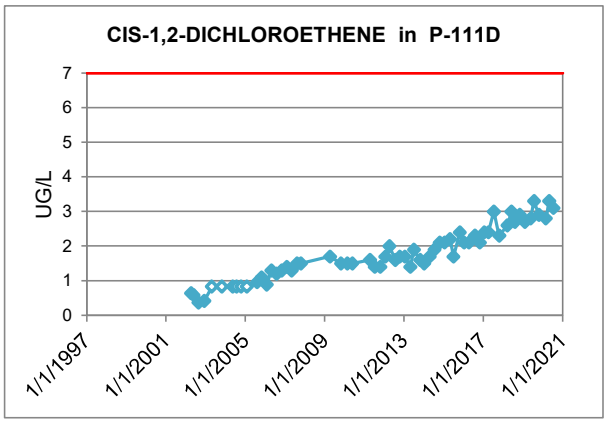
Nondetect results are represented with hollow symbols plotted at the detection limit.

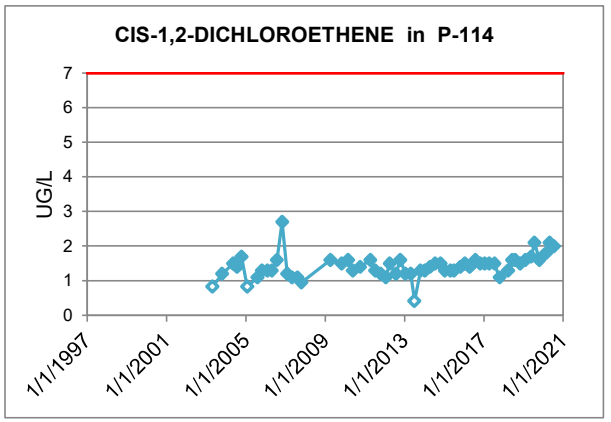


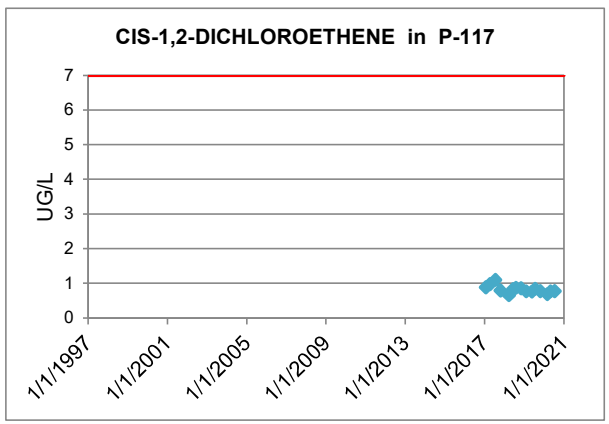








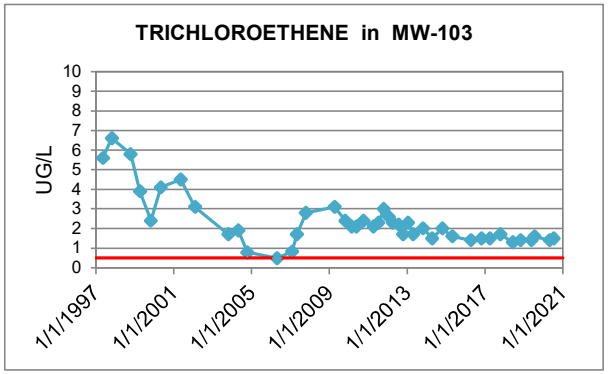


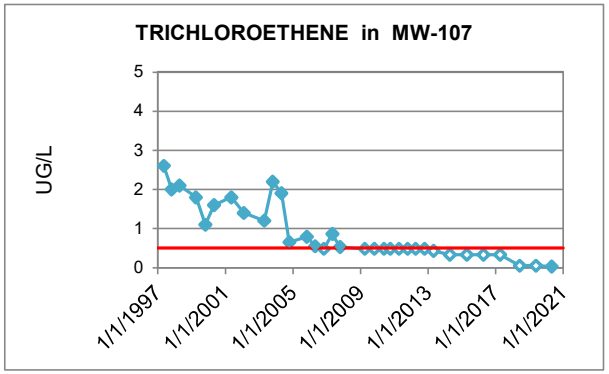


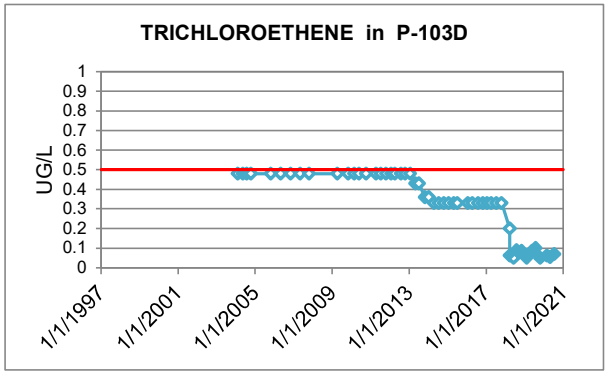
Notes:

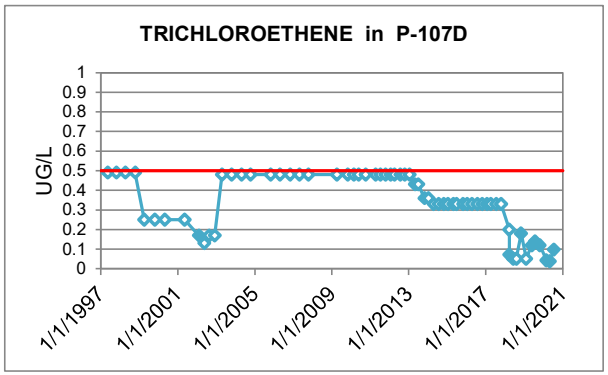
The red line represents the NR 140 PAL.

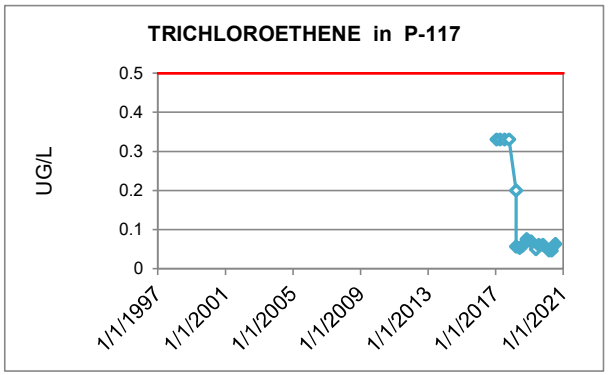
Nondetect results are represented with hollow symbols plotted at the detection limit.











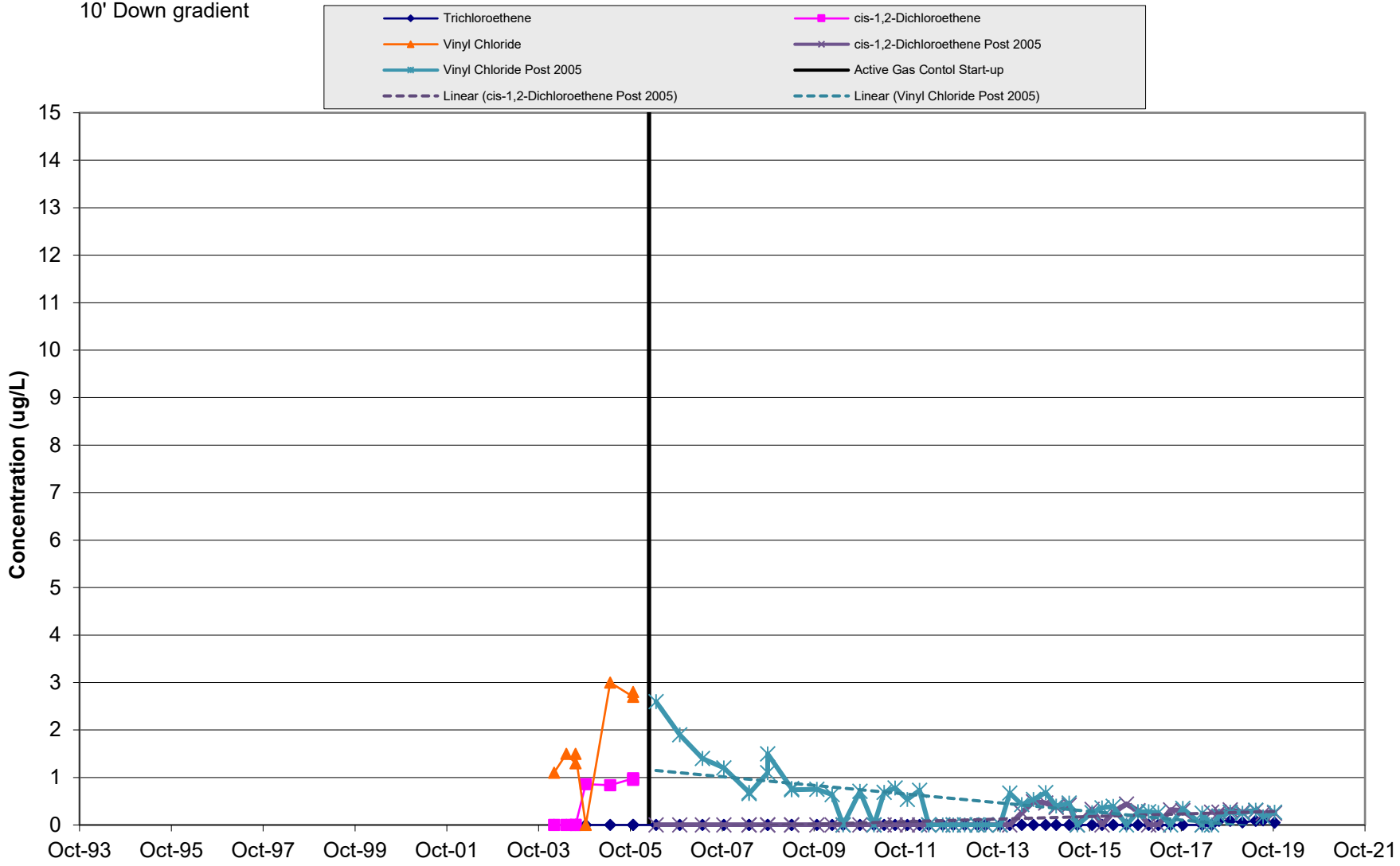
Notes:

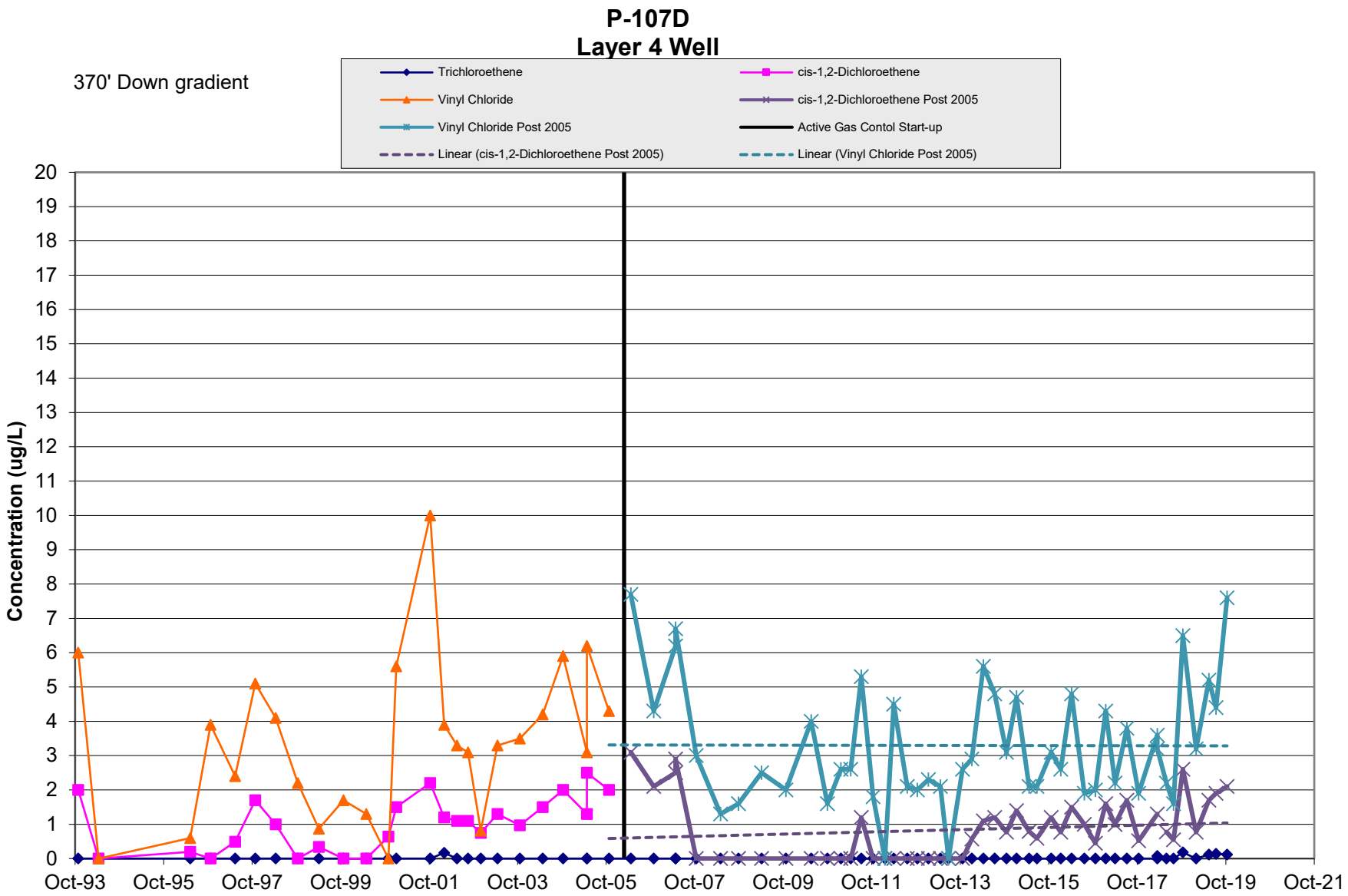
The red line represents the NR 140 PAL.

Nondetect results are represented with hollow symbols plotted at the detection limit.

P-103D
Layer 3 Well

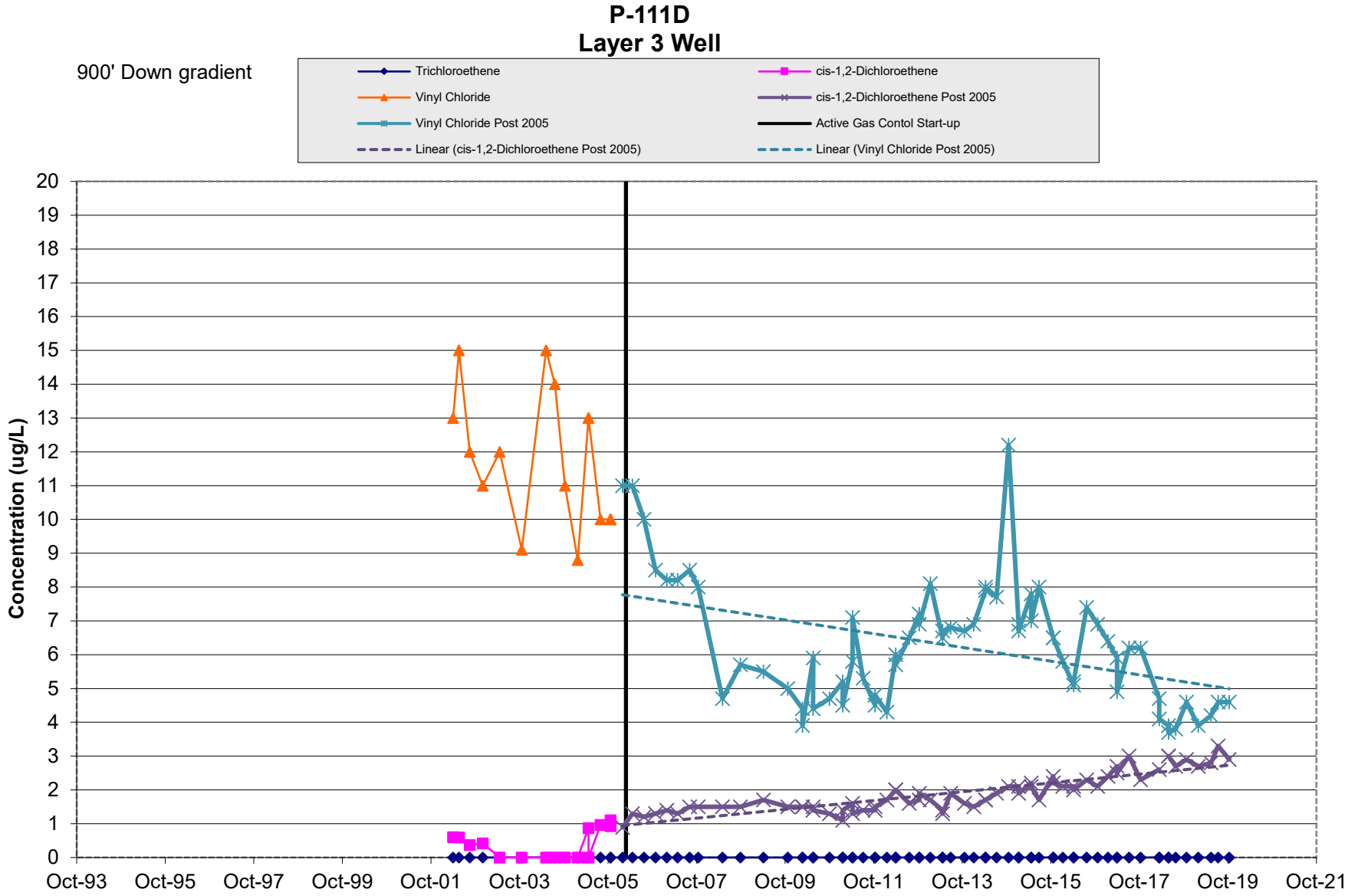
10' Down gradient




P-107D
Layer 4 Well
370' Down gradient
Trichloroethene
cis-1,2-Dichloroethene
Vinyl Chloride
cis-1,2-Dichloroethene Post 2005
Vinyl Chloride Post 2005
Active Gas Contol Start-up
Linear (cis-1,2-Dichloroethene Post 2005)
Linear (Vinyl Chloride Post 2005)
Concentration (ug/L)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Oct-93
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
Oct-13
Oct-15
Oct-17
Oct-19
Oct-21

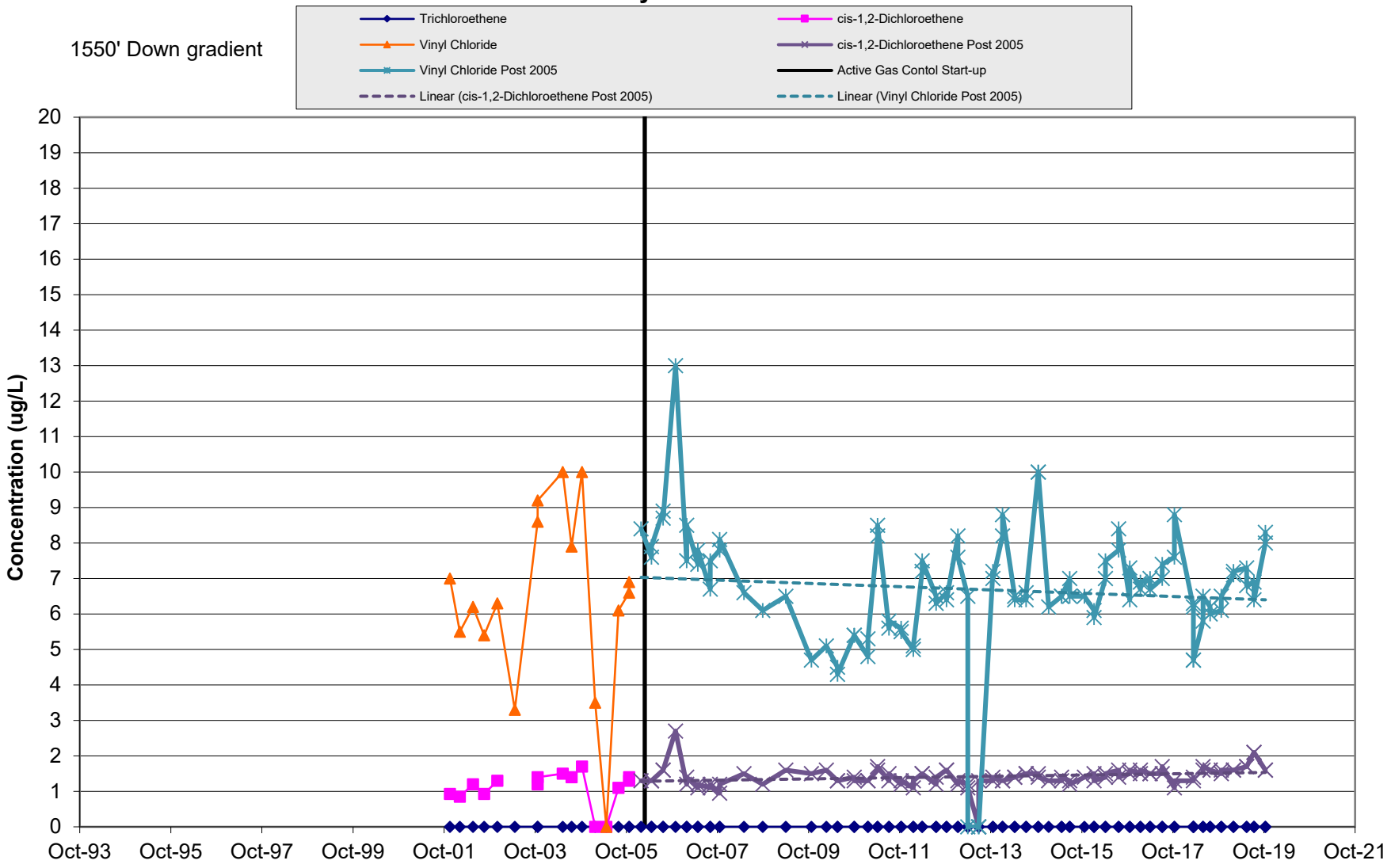
P-111D
Layer 3 Well

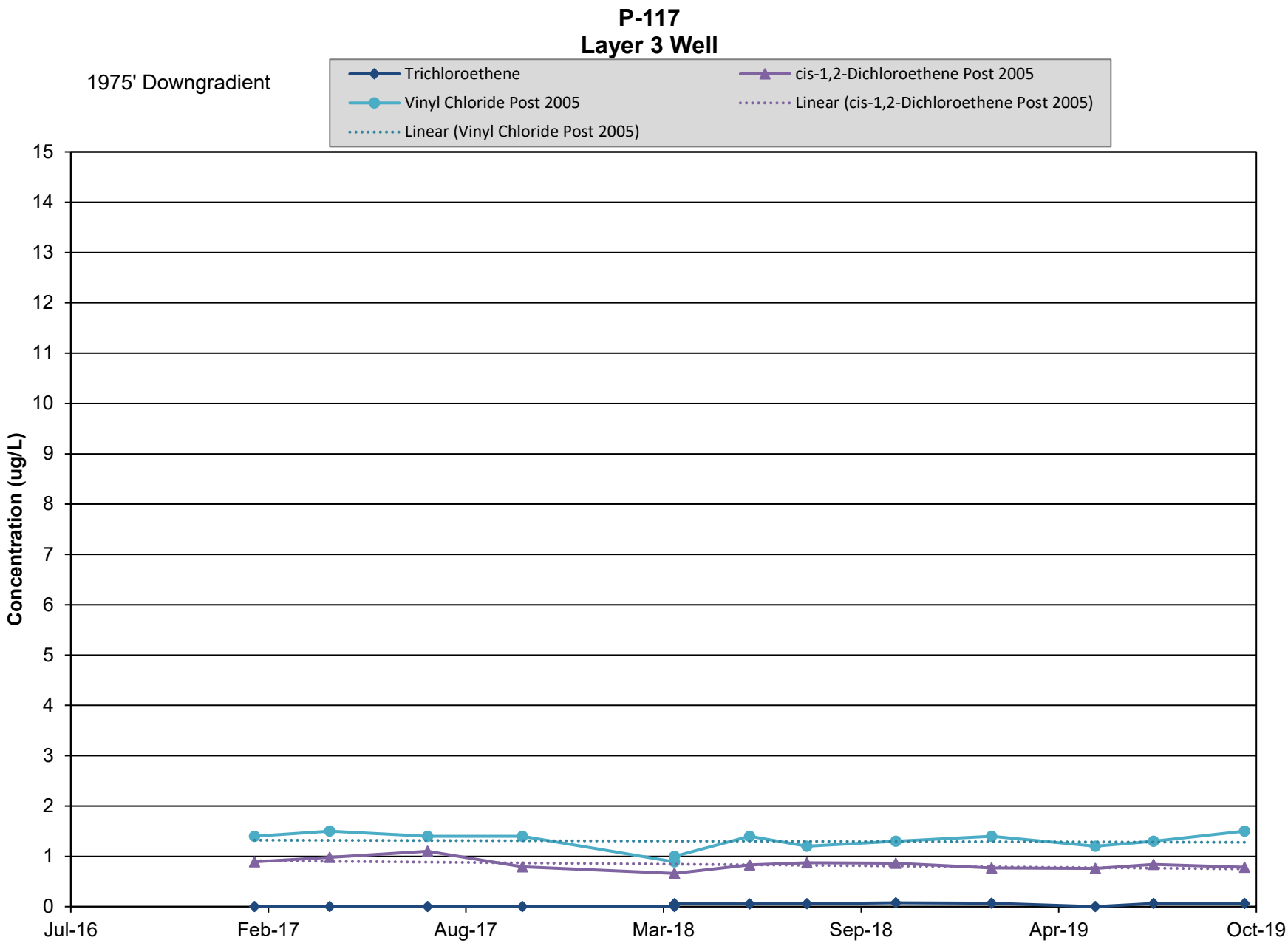
900' Down gradient

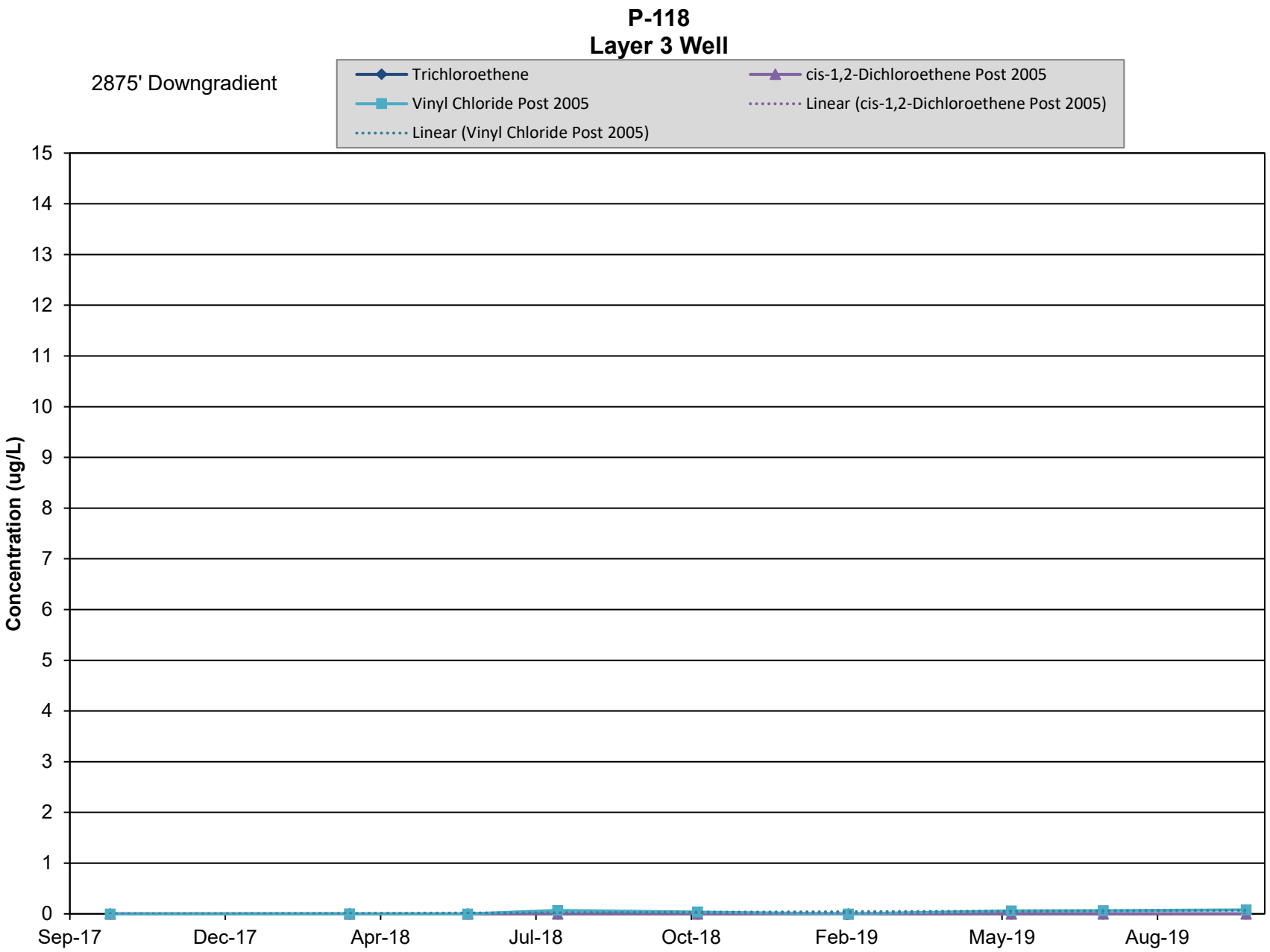


P-114
Layer 3 Well

1550' Down gradient




P-117
Layer 3 Well
1975' Downgradient
Trichloroethene
cis-1,2-Dichloroethene Post 2005
Vinyl Chloride Post 2005
Linear (cis-1,2-Dichloroethene Post 2005)
Linear (Vinyl Chloride Post 2005)
Concentration (ug/L)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Jul-16
Feb-17
Aug-17
Mar-18
Sep-18
Apr-19
Oct-19


P-118
Layer 3 Well
2875' Downgradient
Trichloroethene
cis-1,2-Dichloroethene Post 2005
Vinyl Chloride Post 2005
Linear (cis-1,2-Dichloroethene Post 2005)
Linear (Vinyl Chloride Post 2005)
Concentration (ug/L)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Sep-17
Dec-17
Apr-18
Jul-18
Oct-18
Feb-19
May-19
Aug-19

APPENDIX F – SITE INSPECTION FORM

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Ripon City (FF/NN) Landfill	**Date of inspection: 8/14/2019**
Location and Region: Ripon, WI Region 5	**EPA ID:** WID980610190
Agency, office, or company leading the five-year review: Wisconsin DNR	**Weather/temperature: 75 degrees, sunny**

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other___Gas collection _____
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

_____

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** ___Jeff Tracy_____ ____PRP Group Contact __9/14/2019__
   Name Title Date
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached ____Quarterly reports submitted_____
   _____

2. **O&M staff** _____ _____ _____
Name Title Date
Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
Problems, suggestions; ☐ Report attached _____
_____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

Zoe McManama interviewed Town of Ripon Board Chair in 2019 in order to help change a local town ordinance granting an exemption to R and R Wash Materials Inc that allowed dewatering within 1200 feet of the landfill. On May 13, 2019, the Town Board rescinded the exemption by changing the town ordinance. City Clerk Cindy Beier forwarded the changed ordinance on July 26, 2019.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**
   - ☐ State in-house
   - ☐ Contractor for State
   - ☐ PRP in-house
   - ☐ Contractor for PRP
   - ☐ Federal Facility in-house
   - ☐ Contractor for Federal Facility
   - ☐ Other_____

2. **O&M Cost Records**
   - ☐ Readily available ☐ Up to date
   - ☐ Funding mechanism/agreement in place
   - Original O&M cost estimate_____ ☐ Breakdown attached

   Total annual cost by year for review period if available

   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost

   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost

   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost

   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost

   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A
   Remarks_____Fencing intact._____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks____No trespassing signs intact._____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) __Self-reporting, site inspection, drive by_____
Frequency _____Quarterly by RP; twice annually by DNR in 2019/2020_____
Responsible party/agency ____TRC (consultant) and WDNR_____
Contact __Jeff Tracy_____ ____PRP Group Contact__ _Quarterly_ __414.918.7481__
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Report attached

_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks_____
_____
_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks_____
_____

2. **Land use changes on site** ☒ N/A
Remarks_____
_____

3. **Land use changes off site** ☐ N/A
Remarks_____Groundwater extraction stopped at two nearby surface mines to prevent plume expansion.

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A
Remarks_____
_____

B. Other Site Conditions

Remarks _____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☒ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☒ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks___The RP constructed a new drainage swale in one area where water tended to pond on the landfill surface. After swale construction and stabilization, ponding ceased to occur. __
_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
Areal extent_____
Remarks_____
_____

B. Benches ☐ Applicable ☐ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☒ Active ☒ Passive
☐ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____
_____

2. **Gas Monitoring Probes**
☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

3. **Monitoring Wells** (within surface area of landfill)
☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

4. **Leachate Extraction Wells**
☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☒ Collection for reuse
   ☒ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☒ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____
   _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☒ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Based on field observation, the remedy appears to work as designed. The cover is protective; the wells, gas probes and vents are operative; the gas extraction system is in place and functioning. The site surface water is well diverted, and the cover is in tact and maintained. Fencing is in place. Groundwater extraction no longer occurs at the nearby neighbors.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The do not appear to be any problems with O and M. Quarterly reports are well documented, and reflect what was observed at the site. The bi-weekly gas readings assure that the site is maintained as soon as problems arise (which are infrequent).

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There are no indicators of remedy ineffectiveness based on the field observations.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The PRPs have already capitalized on optimization, by rotating gas extraction points. No other optimization appears possible.