US EPA RECORDS CENTER REGION 5
541520

FOURTH FIVE-YEAR REVIEW REPORT FOR FOR LAUER I SANITARY LANDFILL SUPERFUND SITE (A.K.A. BOUNDARY ROAD LANDFILL) WAUKESHA COUNTY, WISCONSIN

Prepared by

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for

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARARs	applicable or relevant and appropriate requirements
BETX	benzene, ethylbenzene, toluene, xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
ESs	enforcement standards
EPA	United States Environmental Protection Agency
FYR	five-year review
GEMS	Groundwater and Environmental Monitoring System
ICs	institutional controls
MW	Monitoring Well
NCP	National Contingency Plan
NPL	National Priorities List
NR	Natural Resources (as in "NR 140.28, WAC")
O&M	operation and maintenance
OU	operable unit
PAHs	polycyclic aromatic hydrocarbons
PALs	preventive action limits
PCBs	polychlorinated biphenyls
PRP	potentially responsible party
RA	remedial action
RAOs	remedial action objectives
RD	remedial design
RI	remedial investigation
ROD	Record of Decision
Site	Lauer I Sanitary Landfill Superfund Site, also known as the Boundary Road Landfill Site
UU/UE	unlimited use/unrestricted exposure
VOCs	volatile organic compounds
WAC	Wisconsin Administrative Code
WDNR	Wisconsin Department of Natural Resources
WMWI	Waste Management of Wisconsin, Inc.

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 United States Environmental Protection Agency (EPA) prepared this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 C.F.R. Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the Lauer I Sanitary Landfill Superfund Site, which is also known as the Boundary Road Landfill Site (the Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared due to the fact that 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 one operable unit (OU), which is addressed in this FYR.

The Lauer I Sanitary Landfill (a.k.a. Boundary Road Landfill) Superfund Site FYR was led by Thomas A. Wentland, Wisconsin Department of Natural Resources (WDNR) Project Manager. Participants included Susan Pastor, EPA Community Involvement Coordinator, Linda Kern, EPA Remedial Project Manager, and Rebecca Frey, EPA Superfund Remedial Program Section Chief. The potentially responsible party (PRP), Waste Management of Wisconsin, Inc. (WMWI), was notified of the initiation of the FYR in a letter from WDNR dated 2/3/2017. The review began on 2/3/2017.

Site Background

The Site is located in the northeastern portion of the Village of Menomonee Falls, Wisconsin. See Figure 1. The Site occupies approximately 58 acres of a 75-acre tract of land. The Site is situated in an urbanizing area, with mixed surrounding land uses, including some residential, industrial, and commercial land uses. A refuse collection operation has been maintained on the property since the Site began operation.

The landfill began operation in 1954 as part of a sand and gravel operation and ceased operations in 1971. WMWI or its predecessor companies have maintained ownership of the landfill. The entire landfilled area is covered by an impermeable final cover. Except for a small portion of the Site that has an asphalt paved parking lot designed into the final cover to be used for truck parking by a WMWI refuse collection operation, the Site is seeded to grass and mowed. The current and future plan for the Site is to maintain it as a grassed area with no additional uses anticipated at this time. The refuse collection operation is expected to continue into the foreseeable future. Surrounding land uses are residential to the east, and industrial/commercial to the north, west and south. These uses have not changed appreciably in the immediate area of the Site within the past five years and are not expected to change in the future.

The original landfill volume was about 1.3 million cubic yards of waste with an average depth of 30 feet. The original final cover ranged in depth from 0.5 to 8.0 feet with the average depth being

3.5 feet. When the Site ceased operation in 1971, it was closed and covered commensurate with industry practice at that time. The landfill is unlined, which allowed hydraulic connection between the landfill and the underlying and adjacent glacial till. Although the majority of the landfill is underlain by clay till, there is some sand and gravel in the northeast corner of the Site. Due to the fact that waste was placed below the groundwater table, outward migration of leachate provided a means for landfill contaminants to reach the surrounding aquifer.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Lauer I Sanitary Landfill, a.k.a. Boundary Road Landfill		
EPA ID: WID058735994		
Region: 5	**State:** WI	**City/County:** Menomonee Falls/Waukesha
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: State		
Author name: Thomas A. Wentland		
Author affiliation: Wisconsin Department of Natural Resources		
Review period: 2/3/2017 - 8/31/2017		
Date of site inspection: 8/2/2017		
Type of review: Statutory		
Review number: 4		
Triggering action date: 9/20/2012		
Due date: 9/20/2017		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Contaminants found in the groundwater at the landfill during the remedial investigation (RI) include:

Volatile Organic Compounds (VOCs)

Ketones: Compounds found in resins, paint removers, cement adhesives, and cleaning fluids (e.g., acetone, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, isophorone).

Benzene, ethylbenzene, toluene, xylene (BETX) compounds: Partially water-soluble products from gasoline, oil, and other hydrocarbon products.

Chlorinated ethenes: Chlorinated ethenes, including tetrachloroethene, trichloroethene, dichloroethene, and vinyl chloride. These compounds are common industrial compounds.

Chlorinated ethanes: Chlorinated ethanes, including 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1,1-trichloroethane, 1,2-dichloroethane, 1,1-dichloroethane, and chloroethane. These compounds are common industrial solvents and represent a potential degradation sequence.

Semi-VOCs

Phenols: A group of chemicals of similar composition used in adhesives, epoxies, plastics, and a variety of synthetic fibers and dyes. Compounds in the group include chlorinated, methylated, and nitrified phenols. Benzoic acid, a carbolic acid, is also included with the phenols because it may be a degradation product of these compounds.

Chlorinated benzenes: Used as solvents and reagents in a variety of chemical manufacturing processes and materials, including certain pesticides (e.g., dichloro-diphenyl-trichloroethane, commonly known as DDT). Compounds in this group include chlorobenzene, hexachlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, and 1,2,4-trichlorobenzene.

Polycyclic aromatic hydrocarbons (PAHs). A group of compounds associated with and derived from coal and oil (e.g., naphthalene, pyrene, etc.). They are also by-products of the incomplete combustion of carbonaceous materials.

Phthalates: Compounds associated with plastics and plastic-making processes.

Pesticides/Polychlorinated Biphenyls (PCBs)

Pesticides: A group of chlorinated compounds used for insect control (e.g. Aldrin, Endrin, etc.). The use of these pesticides has for the most part been discontinued.

PCBs: Mixtures of chlorinated biphenyls identified as Aroclors formerly used extensively in industrial applications.

Contaminants found in the leachate at the landfill during the RI include:

BETX compounds
chlorinated benzenes
phenols and PAHs
chlorinated ethenes
chlorinated ethanes
total ketones
tetrahydrofuran
styrene
methylene chloride
nitrobenzene
N-nitrosodiphenylamine
carbazole
dibenzofuran

Contaminants found in surface soils at the landfill during the RI include:

PAHs
pesticides
xylenes
bis(2-ethylhexyl)phthalate
PCBs, specifically Aroclor 1260 and 1254

A baseline risk assessment conducted during the RI indicated that several media were found to be of concern under particular exposure conditions to human and/or ecological populations. The following is a summary of the media and exposure pathways that were estimated to pose a health concern:

Groundwater: It was assumed that people could ingest, then and in the future, contaminated groundwater from on-site or off-site monitoring wells, or inhale contaminants released from using water (such as while showering) from on-site or off-site monitoring wells.

Surface soils: It was assumed that, in the future, on-site residents could ingest or come into dermal contact with contaminated surface soils.

Sediment: It was assumed that, in the future, on-site residents could ingest contaminated sediment.

Surface water: It was assumed that, then and in the future, sensitive aquatic organisms may be impacted from chemicals detected in surface water.

Groundwater was a medium of concern as a result of a baseline risk assessment hazard index estimate greater than one. Surface soils, sediment, and surface water were potential media of concern based on a baseline risk assessment cancer risk estimate greater than 10^{-6} but less than 10^{-4}. EPA's acceptable risk range is a cancer risk range between 10^{-6} and 10^{-4} and a non-cancer hazard index less than one.

Response Actions

As a result of State enforcement actions, WMWI installed an approved landfill cover with vegetation. Because leachate was seeping into surface water next to the Site, WMWI installed a slurry cutoff wall and leachate collection system in the early 1980s along the southern perimeter of the Site to reduce leachate movement to surface water. All of this work was completed on or before December 1981. In 1983 WDNR recommended that the Site be placed on the National Priorities List (NPL), and EPA placed the Site on the NPL in 1984. WMWI entered into an Environmental Repair Contract with WDNR in 1990 to investigate and remediate the landfill pursuant to State statutes. WMWI has been monitoring and maintaining the Site since its closure in 1971.

WDNR issued the Record of Decision (ROD) for the Site on 3/21/1996, with EPA concurrence. The ROD contained the following remedial action objectives (RAOs) for the Site:

RAO for Surface Soils:

- Reduce potential future exposure to contaminants by ingestion and dermal contact.

RAOs for Landfill Gas:

- Reduce off-site migration of landfill gas.
- Control the release of on-site landfill gas to the atmosphere.

RAO for surface water:

- Minimize the landfill's potential impact on surface water quality.

RAOs for groundwater:

- Maintain leachate levels established for the Site.
- Maintain an inward groundwater gradient at the Site.
- Reduce the concentration of contaminants that exceed NR 140 groundwater quality standards at Site wells outside the waste management area.

The major components of the remedy selected in the ROD include the following:

- Construction of a new multi-layer soil cover system over the landfill meeting state solid waste requirements.
- Installation of leachate extraction measures in the northeastern portion of the Site.
- Installation of an active landfill gas extraction system.
- Construction of a new leachate conveyance to transmit all extracted leachate from the Site to the local sanitary sewer system.
- Continued operation and maintenance (O&M) of an existing slurry cut-off wall and leachate collection system.
- Implementation of proper institutional controls (ICs), including land use/deed restrictions to prevent unauthorized excavation, groundwater use or installation of water supply wells on the Site.
- Installation of new fencing and improvement of existing fencing to restrict Site access.
- Long-term monitoring of groundwater, surface water and landfill gas.

Status of Implementation

In a 1990 Environmental Repair Contract (# SF-90-01) signed with WDNR, WMWI agreed to perform a remedial investigation/feasibility study, a remedial design (RD) and a remedial action (RA). The RD was completed in conformance with the ROD, and was approved by WDNR on September 18, 1997.

The RA took place in two phases. The original design for the RA was based on re-using all the on-site cover soils to complete reconstruction of the final cover system. However, as the project progressed, it became apparent that the on-site soils would be exhausted prior to cover completion. The construction activities completed in 1997 included approximately 26.4 of the 45.5 acres of final cover soils placement, approximately 12 acres of asphalt paving, installation of three leachate extraction wells, installation of the majority of the landfill gas and leachate transfer piping, and seeding, fertilizing, and mulching the portion of the landfill that had a soil final cover. Construction resumed in July 1998 using a new off-site source of cover material. The 1998 construction activities consisted of 19.1 acres of final cover soil placement, installation of the blower-flare station, and seeding, fertilizing, and mulching of the new soil final cover.

The cover was constructed of a six-inch grading layer, two feet of compacted clay, 1.5 feet of frost protection/rooting zone and six inches of topsoil. The cover was seeded and vegetation established. A service road was constructed on the final cover to allow service vehicle access for O&M. Surface water control at the Site was incorporated into the final cover design. At the time of remedy construction, a portion of the Site was utilized by an active WMWI refuse collection operation. To allow for its continued operation, the area of the Site being utilized for this purpose was covered with a sufficient thickness of asphalt to allow for heavy truck traffic and prevent contact with the waste and minimize infiltration.

A new leachate control system was constructed in the northeast area of the landfill. This system and the existing leachate control system adjacent to the slurry cut-off wall along the southern perimeter of the Site was connected to a new force main to convey the leachate to the Milwaukee Metropolitan Sewerage system.

An active landfill gas extraction system was installed to collect gases generated by the Site and minimize the potential for gas migration. The system consists of vertical and horizontal extraction pipes connected to a vacuum extraction system that extracts gas from the depths of the waste. Extracted gas is burned by an automatic flare system.

The construction work was completed in October 1998. WDNR determined that all RA activities were performed according to specifications. The Site achieved construction completion status in September 1999 with the signing of the Preliminary Close Out Report.

Figure 2 shows current Site features.

Institutional Controls

ICs are required to ensure the protectiveness of the remedy. ICs are non-engineered instruments such as administrative and legal controls that help to minimize the potential for exposure to contamination and protect the integrity of the remedy. ICs are required to assure long-term protectiveness for areas which do not allow for UU/UE.

At this Site, ICs are required where waste is left in place (i.e., under the soil cover) and where cleanup levels exceed health-based standards. All required ICs at the Site are in place. The areas of the Site that require ICs and that are covered by the ICs are depicted in Figure 3.

The table below summarizes the status of the ICs at the Site.

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)
Final Cover Area of Boundary Road Landfill Property	Yes	Yes	Area of the Site with NR 504.06 landfill final cover; area of surface water pond and leachate collection system; and methane gas flare station area	Prohibit residential use of the areas and prohibit interference with the final cover	Deed Restriction signed on 9/6/2007 and recorded with Waukesha County Register's Office on 9/12/2007
Paved Parking Lot and Refuse Collection Operation on Boundary Road Landfill	Yes	Yes	Paved area of Site	Prohibit residential use	Deed Restriction signed on 9/6/2007 and recorded with Waukesha County Register's Office on 9/12/2007
Site Remedial Components	Yes	Yes	Areas of Site with remedial component, including Subtitle D final cover, methane gas collection and flare system, and leachate collection and pumping system	Prohibit interference with the systems	Deed Restriction signed on 9/6/2007 and recorded with Waukesha County Register's Office on 9/12/2007
On-Site Groundwater	Yes	Yes	Area of the Site where groundwater exceeds health-based cleanup standards	Prohibit groundwater use until cleanup standards are achieved	Deed Restriction signed on 9/6/2007 and recorded with Waukesha County Register's Office on 9/12/2007

Status of Access Restrictions and ICs: Access to the Site is controlled by fencing or natural barriers. All required ICs are in place.

Current Compliance: Based on inspections and discussions with Site personnel, WDNR and EPA are not aware of Site or media uses which are inconsistent with the stated objectives of the ICs. All available information demonstrates that the ICs are functioning as intended.

IC Follow-up Actions Needed: The only IC follow-up action needed is that long-term stewardship procedures for ICs need to be put in place to ensure long-term protectiveness at the Site. (See discussion below.)

Long-term Stewardship: Long-term protectiveness at the Site requires compliance with use restrictions to assure the remedy continues to function as intended. To assure proper maintenance and monitoring of ICs, long-term stewardship procedures for the ICs need to be put in place. The long-term stewardship procedures need to include regular inspection of the ICs at the Site and annual certification to WDNR and EPA that the ICs remain in place and are effective.

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 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1, Sitewide	Short-term Protective	The assessment of this five-year review for the Boundary Road Landfill Site found that the remedy is protective of human health and the environment in the short term. The remedy currently protects human health and the environment because the landfill cap adequately provides protection against direct contact with unacceptable levels of site contaminants. The groundwater flow regime is controlled and monitored to prevent further migration of groundwater contaminants from the site. Current monitoring data indicate that the remedy is functioning as required to provide protection to and of the groundwater. Data indicate that there continue to be no ecological risks, and human health risks are addressed by the remedy. Currently there are no known users of the contaminated groundwater underneath the site. Surface water is currently being protected through final cover maintenance and gradient control at the site, and routine monitoring is being conducted. Long-term protectiveness requires implementation of and compliance with effective institutional controls, as well as maintaining the site remedy components and continued monitoring of leachate, landfill gas, and groundwater. Long-term protectiveness will be achieved when all groundwater cleanup goals are achieved. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

Table 3: Status of Recommendations from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
The IC Plan should be finalized to ensure long-term protectiveness.	Finalize IC Plan	Ongoing	This recommendation from the last FYR was not completed. The intent of the recommendation was to develop long-term stewardship procedures for the ICs. This issue and recommendation is carried forward in this FYR, but in a different form (see Section VI, below).	Not applicable

In addition to the issue and recommendation shown above, another issue and recommendation was identified during the 2012 FYR that did not impact the protectiveness of the remedy. The FYR stated that the groundwater monitoring plan needed to be optimized. On April 2, 2014, WDNR approved WMWI's revised groundwater monitoring plan to address this issue and recommendation.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement, & Site Interviews

A public notice was made available by a newspaper ad published in the Milwaukee Journal Sentinel newspaper on 3/7/2017, explaining that the FYR process had started and inviting the public to contact the WDNR project manager for more information. A copy of the public notice is included as Appendix C. The FYR report will be made available at the Site information repository located at the Village of Menomonee Falls Public Library, W156N8446 Pilgrim Road, Menomonee Falls, Wisconsin. WDNR received no inquiries following the ad. No interviews were conducted due to low community interest.

Data Review

Environmental post-construction monitoring data has been collected at the Site since 1999. A long-term sampling and analysis plan has been implemented to show compliance with the ROD. Three categories of wells (down gradient monitoring, down gradient private, and inward gradient monitoring) were selected to monitor the RA. The electronic database maintained by the WDNR, entitled "Groundwater and Environmental Monitoring System" (GEMS), was used to evaluate Site conditions. This database contains historical as well as recent monitoring results required by the ROD. Data has been collected by both Site personnel and State agencies.

Results from the down gradient monitoring well samples from September 2016 – the most recent comprehensive monitoring round – indicate that VOCs were not detected at concentrations that exceed the WDNR enforcement standards (ESs) of Wisconsin Administrative Code (WAC) Chapter NR 140, with the following exceptions:

- An exceedance for boron in well P103R on the eastern side of the Site and TW-24R on the southeastern side of the Site; and
- An exceedance of chloroform at MW117 on the eastern side of the Site.

No VOC detections have been recorded at private wells east of the Site throughout the last five-year monitoring period.

Benzene, chloroethane, and 1,1,1-trichloroethane are other VOCs that have historically been detected in monitoring wells at the Site. However, since March 2012, only benzene has exceeded the ES at one on-site monitoring well location (P107 in June 2012, June 2013, and September 2014).

Very low levels of methylene chloride (which is a common laboratory contaminant) were detected at some Site monitoring wells for the first time in samples collected in June 2005 and June 2006. This same compound was detected at low levels at some monitoring wells during the last five-year monitoring period; however, the compounds were often detected in the laboratory method blank or at estimated low concentrations that were "j-flagged." Additionally, analysis of the landfill leachate does not suggest these compounds are being released from the Site. Between 2012 and 2016, methylene chloride was detected in the trip blank collected during the September 2015 and September 2016 sampling events.

In addition, several chlorinated compounds (e.g., 1,1-dichoroethene and 1,2-dichlorethane) continue to be detected at a small number of monitoring wells. These detections, particularly at MW117, do not appear to be landfill-related since these compounds are not generally detected in landfill leachate. Since most of these chlorinated compounds are below the ESs and WDNR preventive action limits (PALs) or

are estimated at low concentrations (j-flagged), they are not believed to be of particular significance at this time. Vinyl chloride was detected above the ES at MW117 in 2007 and 2009; however, the concentrations were estimates (j-flagged).

A review of inorganic water quality data indicates that, during the latest five-year monitoring period, five inorganic parameters – dissolved boron, dissolved chloride, iron (dissolved and total), dissolved manganese, and sulfate – were present in five monitoring wells, each at concentrations that exceed an ES. However, these parameters are categorized as public welfare-based rather than public health-based parameters. Public welfare-based parameters are regulated because they impart aesthetically unpleasing characteristics to the water but are not necessarily harmful to a person's health. Public health-based parameters, on the other hand, are regulated due to their carcinogenic and mutagenic impact to human health. In addition, three private wells also contained dissolved iron exceeding the ES in samples collected between 2012 and 2016, but high iron concentrations in private wells are a common occurrence in southeastern Wisconsin. Another public welfare parameter, sulfate, has not exceeded its ES since June 2010.

Reviews of historical monitoring results indicate that dissolved chloride may be increasing in concentration over time at MW117 on the eastern side of the Site. The cause for this possible increase is unclear; however, chloride concentrations at MW117 are typically higher than total concentrations found in analyses of landfill leachate from the Site and may be an indication of influence from road salt due to the well's proximity to the roadway and its shallow depth.

Concentrations of sulfate at MW111 were decreasing during the period evaluated by the previous FYR, but during this FYR period the concentrations at this well have been stable.

Chloride and sulfate appeared to show some signs of increase at the private wells east of the Site during the previous FYR period; however, no concentrations were detected above the PAL during this FYR period. Water quality in this area of the Site will continue to be monitored through the routine monitoring program.

In the June 2012 and 2013 sampling events, one monitoring well (P103R) contained dissolved arsenic that exceeds the ES. Arsenic is another naturally-occurring metal near the Site. Further, several monitoring wells contained one or more dissolved metals during this last five-year monitoring period (typically aluminum, arsenic, barium, iron, and manganese) that exceeded PALs. Under Wisconsin law, exceedances of PALs are considered addressed if a remedy has been put in place and efforts are being made to reduce the concentration of the identified parameters. Such is the case at this Site.

The ROD for the Site requires that an inward groundwater gradient be maintained at the landfill. Monitoring records indicate that an inward gradient is being maintained on the eastern side of the Site where private wells are in close proximity to the Site, as well as on the northern and southern sides of the Site. Water quality information from the western side of the Site, as well as the evaluation contained in the "West Side Gradient Assessment" report (TRC, July 2012) suggest that leachate is contained along this portion of the Site. Records also indicate that the shallow groundwater gradient across the Site is from north to south resulting in groundwater flow toward the cut-off slurry wall and leachate extraction system, as designed. The extraction systems required by the ROD have been installed and are operating properly.

Leachate quality has remained relatively consistent during the most recent five-year period, with constituent concentrations below discharge standards established by the receiving publicly-owned treatment works.

Landfill gas probe monitoring has shown no evidence of landfill gas migration at the Site. During the most recent five-year period, only one sampling event had detections (less than 1 percent by volume) of methane, which was at gas probes 1, 3, 4, 6, and 7 in December 2016.

Site Inspection

The inspection of the Site was conducted on 8/2/2017. In attendance were Thomas A. Wentland, WDNR Project Manager, and Lawrence J. Buechel, P.E., representative of WMWI. The purpose of the inspection was to assess the protectiveness of the remedy. The Site Inspection Checklist is provided in Appendix D.

At the time of the inspection, the annual mowing of the landfill recently had been completed, allowing for a good visual inspection. The landfill was observed to be in excellent condition, with no signs of erosion or rodent burrowing. Abundant rainfall in the spring and early summer of 2017 provided for lush vegetative cover at the time of the inspection.

The WMWI representative explained that WMWI has partnered with the U.S. Forest Service in developing test plots for willow and poplar trees. The U.S. Forest Service is experimenting with different varieties of these tree species to develop trees effective in remediating soil and groundwater through phytoremediation. These experimental plots are off the waste mass, do not disturb the landfill cap, and are not intended to be part of the Site remedy. (See photos in Appendix D.)

A portion on the landfill cap is provided by a paved parking lot used by WMWI for its local refuse collection business. The ROD requires that the pavement be maintained to prevent contact with the waste and to minimize infiltration. Small trees were observed growing through cracks in this pavement. (See photo in Appendix D.) The WMWI representative indicated that the trees would be removed and the pavement repaired.

V. TECHNICAL ASSESSMENT

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

Yes. The review of documents, data, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the Site inspection indicate that the remedy is functioning as intended by the ROD. Installation of the final cover at the Site and construction of the leachate and landfill gas extraction systems has achieved the RAOs of reducing exposure to contaminants by ingestion and dermal contact, reducing off-site migration of landfill gas and groundwater, controlling the release of on-site landfill gas, and minimizing the impact of the landfill on surface water. The review also shows that the remedy is continuing progress toward establishing an inward groundwater gradient.

Most groundwater cleanup goals, identified as ARARs in the ROD, have been met. However, groundwater sampling results show there are still some exceedances of WAC NR 140 water quality standards. Continued implementation of the selected remedy at the Site is expected to result in eventually achieving those standards.

O&M of the final cover and gas extraction system has been effective. Current monitoring data supports that there is an inward gradient maintained on the north, south, and east sides of the Site and that groundwater to the west of the Site does not appear to be affected by the landfill. ICs have been effective in preventing unauthorized excavation of the final cover, groundwater use, and the installation of water supply wells on the Site. Based on inspections and interviews, there appears to be compliance with the stated objectives of the ICs. Long-term protectiveness requires maintenance of the Site remedy components and compliance with the ICs developed for the Site to ensure that the remedy continues to function as intended.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

Yes. The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection are still valid. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy.

Changes in Standards and To-Be-Considered Requirements

ARARs that still must be met at this time are the WAC Chapter NR 140, Water Quality Standards. Operation of the Site indicates compliance with these ARARs. WAC Chapter NR 140 is in constant review and modification as new information on health-related water quality parameters is discovered. The ROD requires that operation of the Site be conducted to comply with changes to WAC Chapter NR 140. As modifications to NR 140 are made, the criteria for evaluating water quality at the Site are updated through the WDNR GEMS database to identify any new water quality exceedances resulting from that update.

Changes in Exposure Pathways, Toxicity Data, and other Contaminant Characteristics

The exposure assumptions used to develop the Baseline Risk Assessment included both current exposures (older child/teenager trespassers) and potential future exposures (adult groundwater consumers). These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. There have been no known changes in risk assessment methodologies or toxicity factors that would affect the protectiveness of the Site remedy. Land uses in the vicinity of the Site have not changed and are expected to remain the same in the future. No new exposure pathways have been identified at the Site. There have been no confirmed changes in contaminants or contaminant sources that call into question the protectiveness of the remedy, and the physical conditions at the Site remain consistent with those that existed at completion of the remedy. No change to these assumptions or the cleanup levels developed from them is warranted.

The Baseline Ecological Risk Assessment suggested that there would be no adverse effects to wildlife in the area from the chemicals at the Site. Greater protection now exists with the remedy in place than at the time the Baseline Ecological Risk Assessment was prepared, so it is logical to assume that less danger to the environment exists now than before. There have been no newly-identified ecological risks at the Site.

Expected Progress Toward Meeting RAOs

The remedy is progressing as expected. The remedy, which is identified as containment, is functioning as designed. The system components are operating and being maintained as needed for continued operation. Data on remedy progress are compiled, evaluated, and routinely reported to WDNR.

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

No. No other information has come to light that could call 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: 1 (Sitewide)	**Issue Category:** Institutional Controls			
	Issue: Procedures are not in place to ensure long-term stewardship of ICs at the Site.			
	Recommendation: Develop and implement long-term stewardship procedures for monitoring and tracking compliance with existing ICs, communicating with WDNR and EPA, and providing an annual certification to WDNR and EPA that the ICs remain in place and are effective.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	3/30/2018

Other Findings

During the FYR inspection, the following issue that does not affect remedy protectiveness was identified:

- Small trees were observed growing through cracks in the pavement in the portion of the landfill cap that consists of a paved parking lot. These trees need to be removed and the pavement repaired.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy at the Lauer I Sanitary Landfill (a.k.a. Boundary Road Landfill) Site currently protects human health and the environment because the landfill cap and the leachate and landfill gas extraction systems have achieved the RAOs of reducing exposure to contaminants by ingestion and dermal contact, reducing off-site migration of landfill gas and groundwater, controlling the release of on-site landfill gas, and minimizing the impact of the landfill on surface water. There are no human exposures to the landfill materials or contaminated groundwater, and all required ICs are in place. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness: long-term stewardship procedures need to be developed and implemented for monitoring and tracking compliance with existing ICs, communicating with WDNR and EPA, and providing an annual certification to WDNR and EPA that the ICs remain in place and are effective.

VIII. NEXT REVIEW

The next FYR report for the Lauer I Sanitary Landfill (a.k.a. Boundary Road Landfill) Superfund Site is required within five years from the signature date of this review.

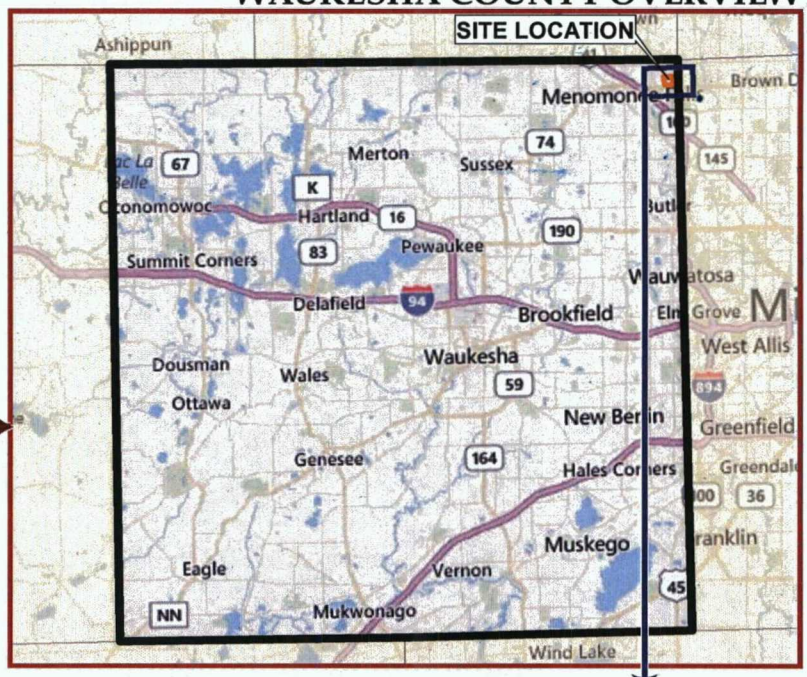
FIGURES

TRC - GIS

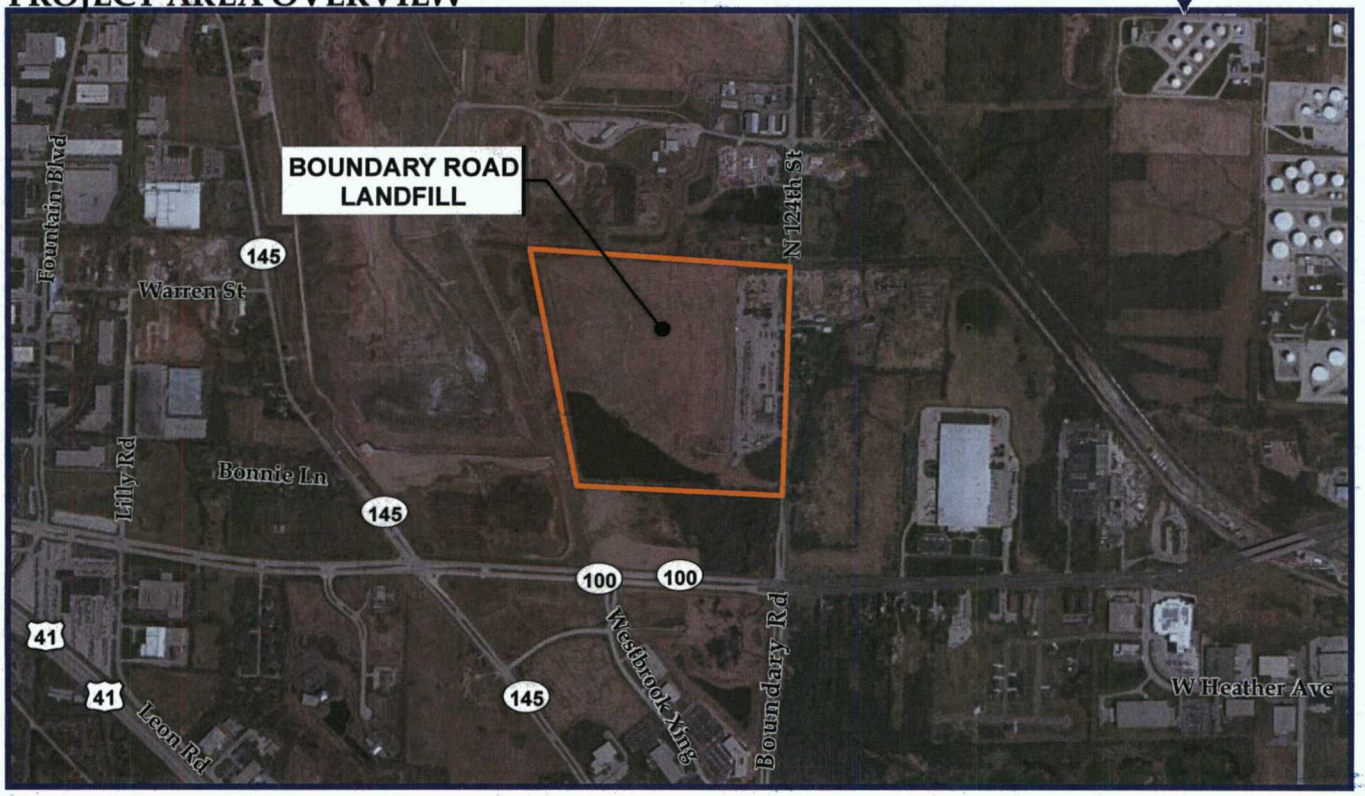
WID058735994

WISCONSIN OVERVIEW

WAUKESHA COUNTY OVERVIEW



PROJECT AREA OVERVIEW



N

MAP DATA PROVIDED BY ESRI, "BING MAPS ROAD", AND "BING MAPS AERIAL" BASEMAP WEB-SERVICES.

TRC

708 Heartland Trail
Suite 3000
Madison, WI 53717
Phone: 608.826.3600

THIRD FIVE YEAR REVIEW REPORT
WASTE MANAGEMENT OF WISCONSIN, INC.
BOUNDARY ROAD LANDFILL
VILLAGE OF MENOMINEE FALLS, WISCONSIN

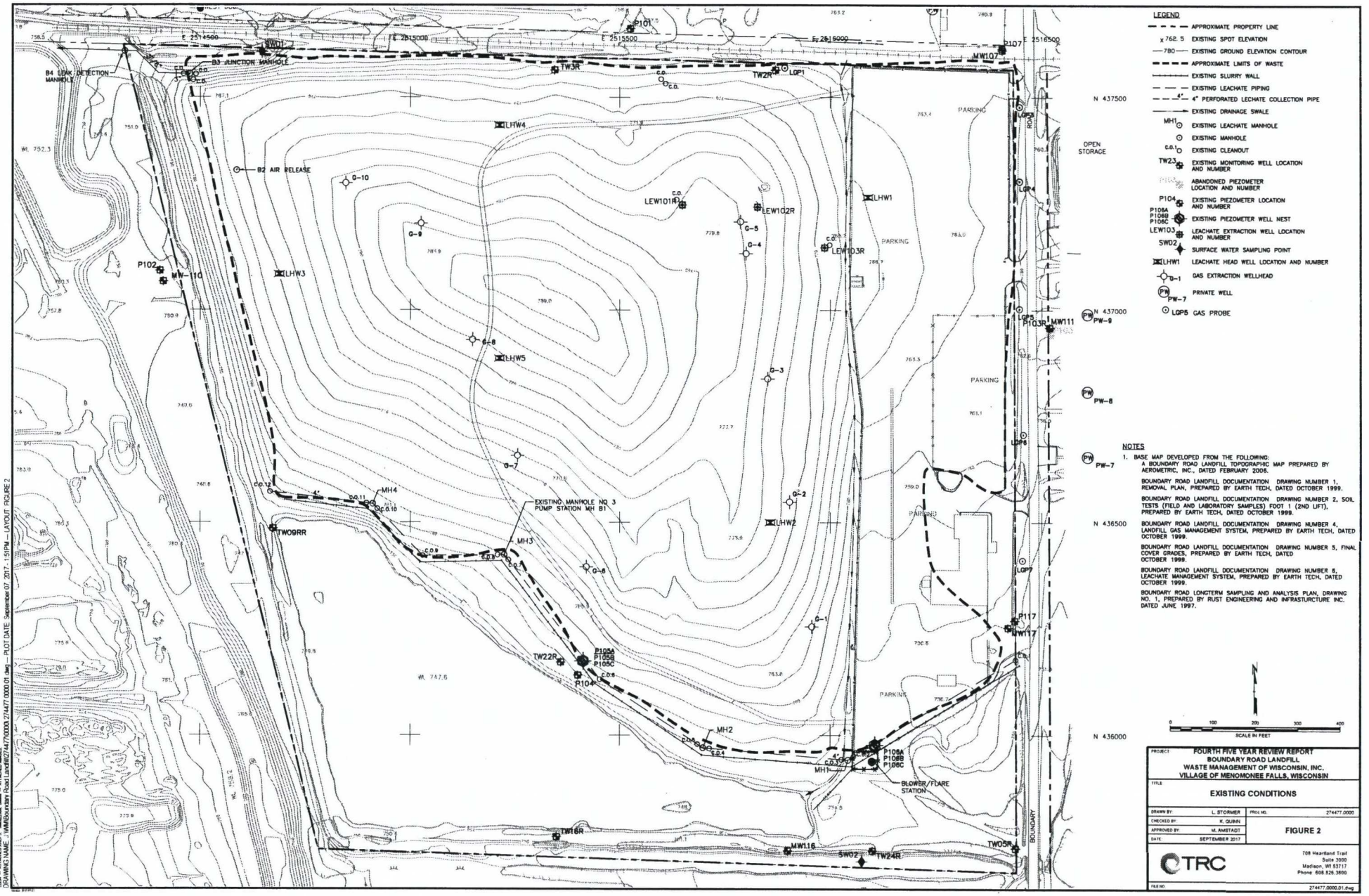
SITE LOCATION MAP

DRAWN BY:	PAPEZ J
APPROVED BY:	AMSTADT M
PROJECT NO:	189803
FILE NO.	189803.001.mxd
DATE:	AUGUST 2012

FIGURE 1

Printed By: jpapez on 8/9/2012, 12:19:04 PM

E:\WasteManagement\BoundaryRdLF\2012_189803\189803.001.mxd


LEGEND
APPROXIMATE PROPERTY LINE
762.5 EXISTING SPOT ELEVATION
780 EXISTING GROUND ELEVATION CONTOUR
APPROXIMATE LIMITS OF WASTE
EXISTING SLURRY WALL
EXISTING LEACHATE PIPING
4" PERFORATED LECHATE COLLECTION PIPE
EXISTING DRAINAGE SWALE
MH1 EXISTING LEACHATE MANHOLE
EXISTING MANHOLE
C.O.1 EXISTING CLEANOUT
TW23 EXISTING MONITORING WELL LOCATION AND NUMBER
ABANDONED PIEZOMETER LOCATION AND NUMBER
P104 EXISTING PIEZOMETER LOCATION AND NUMBER
P105A P105B P105C EXISTING PIEZOMETER WELL NEST
LEW103 LEACHATE EXTRACTION WELL LOCATION AND NUMBER
SW02 SURFACE WATER SAMPLING POINT
LHW1 LEACHATE HEAD WELL LOCATION AND NUMBER
G-1 GAS EXTRACTION WELLHEAD
PW PW-7 PRIVATE WELL
LGP5 GAS PROBE
NOTES
1. BASE MAP DEVELOPED FROM THE FOLLOWING:
A BOUNDARY ROAD LANDFILL TOPOGRAPHIC MAP PREPARED BY AEROMETRIC, INC., DATED FEBRUARY 2006.
BOUNDARY ROAD LANDFILL DOCUMENTATION DRAWING NUMBER 1, REMOVAL PLAN, PREPARED BY EARTH TECH, DATED OCTOBER 1999.
BOUNDARY ROAD LANDFILL DOCUMENTATION DRAWING NUMBER 2, SOIL TESTS (FIELD AND LABORATORY SAMPLES) FOOT 1 (2ND LIFT), PREPARED BY EARTH TECH, DATED OCTOBER 1999.
BOUNDARY ROAD LANDFILL DOCUMENTATION DRAWING NUMBER 4, LANDFILL GAS MANAGEMENT SYSTEM, PREPARED BY EARTH TECH, DATED OCTOBER 1999.
BOUNDARY ROAD LANDFILL DOCUMENTATION DRAWING NUMBER 5, FINAL COVER GRADES, PREPARED BY EARTH TECH, DATED OCTOBER 1999.
BOUNDARY ROAD LANDFILL DOCUMENTATION DRAWING NUMBER 8, LEACHATE MANAGEMENT SYSTEM, PREPARED BY EARTH TECH, DATED OCTOBER 1999.
BOUNDARY ROAD LONGTERM SAMPLING AND ANALYSIS PLAN, DRAWING NO. 1, PREPARED BY RUST ENGINEERING AND INFRASTURCTURE INC. DATED JUNE 1997.
N
0 100 200 300 400
SCALE IN FEET
PROJECT: FOURTH FIVE YEAR REVIEW REPORT
BOUNDARY ROAD LANDFILL
WASTE MANAGEMENT OF WISCONSIN, INC.
VILLAGE OF MENOMONEE FALLS, WISCONSIN
TITLE: EXISTING CONDITIONS
DRAWN BY: L. STORMER
CHECKED BY: K. QUINN
APPROVED BY: M. AMSTADT
DATE: SEPTEMBER 2017
PROJ NO. 274477.0000
FIGURE 2
TRC
708 Heartland Trail
Suite 3000
Madison, WI 53717
Phone 608.826.3600
FILE NO. 274477.0000.01.dwg
B4 LEAK DETECTION MANHOLE
B3 JUNCTION MANHOLE
B2 AIR RELEASE
EXISTING MANHOLE NO 3 PUMP STATION MH B1
BLOWER/FLARE STATION
PARKING
OPEN STORAGE
BOUNDARY
N 437500
N 437000
N 436500
N 436000
E 2514500
E 2515000
E 2515500
E 2516000
E 2516500

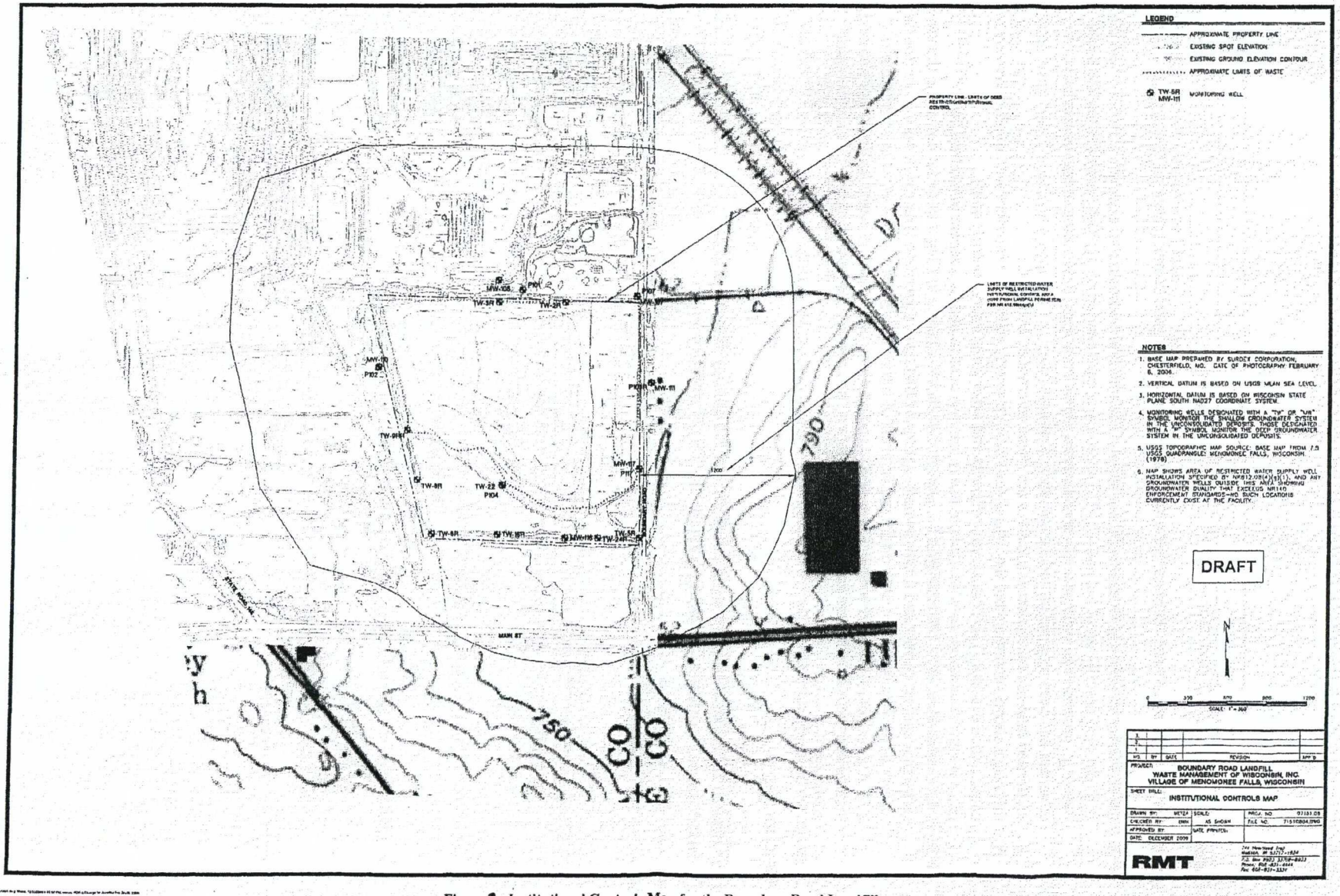


Figure 3: Institutional Controls Map for the Boundary Road Landfill

APPENDIX A – REFERENCE LIST

- WDNR 4/2/14 Long-Term Sampling & Analysis Plan Approval Letter
- WDNR GEMS Database
- TRC July 2012 "West Side Gradient Assessment" report

APPENDIX B – SITE CHRONOLOGY

Table 1: Chronology of Site Events

Event	Date
Landfill operation dates	03/05/1958 – 07/03/1971
Initial discovery of contamination	10/20/1979
Site nominated to National Priorities List (NPL)	06/14/1983
Site listed on NPL	09/13/1984
Effective date of Remediation Contract between WDNR and WMWI	08/01/1990
Remedial Investigation (RI) Complete	08/01/1993
Feasibility Study (FS) Complete	11/20/1994
Proposed Plan Issued	02/15/1995
Record of Decision (ROD) signature	03/21/1996
Remedial Design complete	09/18/1997
Pre-final inspection	11/16/1998
Preliminary Close Out Report signature	09/28/1999
First five-year review completed	09/27/2002
Second five-year review completed	09/20/2007
Site achieves Site-Wide Ready for Anticipated Use designation	08/10/2010
Third five-rear review completed	09/20/2012
Modification to Long-Term Sampling and Analysis Plan	04/2/2014

APPENDIX C – PUBLIC NOTICE AD

WISCONSIN
DEPT. OF NATURAL RESOURCES

Wisconsin Department of Natural Resources
to
Conduct Review of Boundary Road Landfill

The Wisconsin Department of Natural Resources in consultation with the U.S. Environmental Protection Agency is in the process of reviewing the Boundary Road Superfund Site. The Superfund Law requires a review at least every five years at sites were cleanup action has been started but hazardous substances remain on-site. These reviews are done to ensure the cleanup continues to protect human health and the environment. A review was previous done in 2002, 2007and 2012.

This review will include an evaluation of background information, cleanup requirements, effectiveness of the cleanup, and any anticipated future cleanup actions. The Wisconsin Department of Natural Resources and the United States Environmental Protection Agency selected several cleanup actions in 1996:

1. Construction of a new multi-layer soil cover system over the landfill.
2. Installation of an active landfill gas extraction system.
3. Construction of a new leachate conveyance forcemain to transmit all extracted leachate from the site to the local sanitary sewer system.
4. Continued operation and maintenance of an existing slurry cut-off wall and leachate collection system.
5. Implementation of proper institutional controls.
6. Installation of new fencing to restrict site access.
7. Long-term monitoring of groundwater, surface water and landfill gas.

The construction of the landfill cap, gas extraction system, and leachate forcemain were completed in 1998. The five-year review report, which details the site's progress, will be completed in September 2017. At that time the report will be available at the site's official document repository, which is located at:

Village of Menomonee Falls Public Library
W156 N8446 Pilgrim Road
Menomonee Falls, WI

Additional information may be obtained by contacting:
Thomas A. Wentland
Wisconsin Department of Natural Resources
1155 Pilgrim Road
Plymouth, WI
920-892-8756 Ex. 3028

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1155 PILGRIM ROAD
ATTN: THOMAS A. WENTLAND

Plymouth, WI 53073

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Christi Ambrosius

State of Wisconsin

County of Milwaukee

Subscribed and sworn before me this 10 day of March ,2017.

Notary Public State of Wisconsin

My Commission Expires 5-25-18

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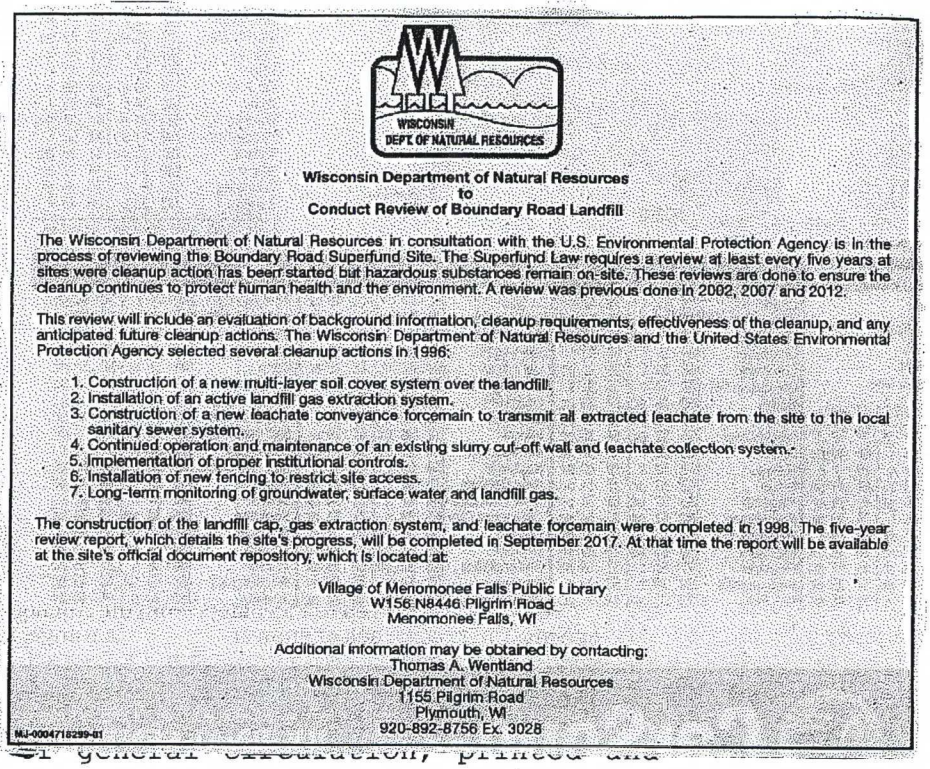
1155 PILGRIM ROAD
ATTN: THOMAS A. WENTLAND

Plymouth, WI 53073



WISCONSIN DEPT. OF NATURAL RESOURCES

Wisconsin Department of Natural Resources
to
Conduct Review of Boundary Road Landfill

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Village of Menomonee Falls Public Library
W156 N8446 Pilgrim Road
Menomonee Falls, WI

Additional information may be obtained by contacting:
Thomas A. Wentland
Wisconsin Department of Natural Resources
1155 Pilgrim Road
Plymouth, WI
920-892-8756 Ex. 3028

MJ-00047/8299-01

Christi Ambrosius hereby st
Media Group to certify or
publisher of the Milwaukee J
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Christi Ambrosius

State of Wisconsin

County of Milwaukee

Subscribed and sworn before me this 10 day of March ,2017.

Notary Public State of Wisconsin

My Commission Expires 5-25-18

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Preparer's Initials: CA

APPENDIX D – SITE INSPECTION CHECKLIST AND PHOTOS

Site Inspection Checklist

I. SITE INFORMATION	
Site name: BOUNDARY ROAD LF	**Date of inspection:** 8-2-17
Location and Region:	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:** SUNNY / 75°

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other METHANE 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** _____ _____ _____
   Name Title Date
   Interviewed ☐at site ☐at office ☐by phone Phone no. _____
   Problems, suggestions; ☐Report attached _____

2. **O&M staff** LARRY BUECHEL DISTRICT MANAGER 8-2-17
   Name Title Date
   Interviewed: ☒at site ☐at office ☐by phone Phone no. 262-529-5639
   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 WISCONSIN DEPT. NATURAL RESOURCES
   Contact TOM WENTLAND PROJECT MANAGER 920-893-8528
   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.

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 SECURE

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks

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)
   Frequency
   Responsible party/agency
   Contact
   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

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_____

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** HEAD
☒ 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 3 Ac. Depth 2-3 FT ☐ 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

E. 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.).

Remedy is functioning as designed

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.

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.

No problems identified

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

PHOTOS TAKEN DURING 8/2/2017 SITE INSPECTION
BOUNDARY ROAD LANDFILL SUPERFUND SITE

Photo of Tree Test Plot 1

Photo of Tree Test Plot 2

Photo of Tree Test Plot 3

Photo of Small Trees Growing Through Cracks in Pavement