REQUEST FOR PROPOSAL

RFP # 25-16

LANDFILL MONITORING AND MAINTENANCE PROGRAM

City of Ann Arbor
Public Works Unit

Due Date: April 8, 2025 by 2:00 p.m. (local time)

Issued By:

City of Ann Arbor
Procurement Unit
301 E. Huron Street
Ann Arbor, MI 48104

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SECTION I - GENERAL INFORMATION

A. OBJECTIVE

The City of Ann Arbor is seeking the services of a professional environmental consultant to perform the necessary task to satisfy the monitoring requirements of the Michigan Department of Environmental Great Lakes and Energy (EGLE) for groundwater and gas in the vicinity of the Ann Arbor Landfill. There are also several record keeping and reporting activities that are to be submitted to the EGLE and the City of Ann Arbor. There are additional needs for environmental consulting services that occur episodically at the landfill and these are outlined in the RFP. This RFP seeks a two-year contract with an option to extend for one or two additional years at the city’s discretion. The Public Works Unit will oversee the direction and quality of work of this consultant.

B. QUESTIONS AND CLARIFICATIONS / DESIGNATED CITY CONTACTS

All questions regarding this Request for Proposal (RFP) shall be submitted via e-mail. Questions will be accepted and answered in accordance with the terms and conditions of this RFP.

All questions shall be submitted on or before March 17, 2025 at 2:00 p.m., and should be addressed as follows:

Scope of Work/Proposal Content questions shall be e-mailed to Erin Donnelly, Environmental Services Manager edonnelly@a2gov.org.

RFP Process and Compliance questions shall be e-mailed to Colin Spencer, Buyer - CSpencer@a2gov.org

Should any prospective offeror be in doubt as to the true meaning of any portion of this RFP, or should the prospective offeror find any ambiguity, inconsistency, or omission therein, the prospective offeror shall make a written request for an official interpretation or correction by the due date for questions above.

All interpretations, corrections, or additions to this RFP will be made only as an official addendum that will be posted to a2gov.org and MITN.info and it shall be the prospective offeror’s responsibility to ensure they have received all addenda before submitting a proposal. Any addendum issued by the City shall become part of the RFP and must be incorporated in the proposal where applicable.

C. PROPOSAL FORMAT

To be considered, each firm must submit a response to this RFP using the format provided in Section III. No other distribution of proposals is to be made by the prospective offeror. An official authorized to bind the offeror to its provisions must sign the proposal. Each proposal must remain valid for at least ninety days from the due date of this RFP.

Proposals should be prepared simply and economically providing a straightforward, concise description of the offeror's ability to meet the requirements of the RFP. No erasures are permitted. Mistakes may be crossed out and corrected and must be initialed in ink by the person signing the proposal.

D. SELECTION CRITERIA

Responses to this RFP will be evaluated using a point system as shown in Section III. A selection committee comprised of staff from the City will complete the evaluation.

The fee proposals will not be reviewed at the initial evaluation. After initial evaluation, the City will determine top proposals, and open only those fee proposals. The City will then determine which, if any, firms will be interviewed. During the interviews, the selected firms will be given the opportunity to discuss their proposal, qualifications, past experience, and their fee proposal in more detail. The City further reserves the right to interview the key personnel assigned by the selected offeror to this project. If the City chooses to interview any respondents, the interviews will be tentatively held the week of **April 21, 2025**. Offeror must be available on these dates.

All proposals submitted may be subject to clarifications and further negotiation. All agreements resulting from negotiations that differ from what is represented within the RFP or in the proposal response shall be documented and included as part of the final contract.

E. SEALED PROPOSAL SUBMISSION

All proposals are due and must be delivered to the City on or before, April 8, 2025 at 2:00 p.m. (local time). Proposals submitted late or via oral, telephonic, telegraphic, electronic mail or facsimile **will not** be considered or accepted.

Each respondent must submit in a sealed envelope

- **one (1) original proposal**
- **one (1) digital copy of the proposal preferably on a USB/flash drive as one file in PDF format**

Each respondent should submit in a single separate sealed envelope marked Fee Proposal

- **one (1) copy of the fee proposal**

The fee proposal and all costs should be separate from the rest of the proposal.

Proposals submitted should be clearly marked: **“RFP No.25-16 –Landfill Monitoring and Maintenance Program**” and list the offeror’s name and address.

Proposals must be addressed and delivered to:
City of Ann Arbor
c/o Customer Service
301 East Huron Street
Ann Arbor, MI 48104

All proposals received on or before the due date will be publicly opened and recorded on the due date. No immediate decisions will be rendered.

Hand delivered bids may be dropped off in the Purchasing drop box located in the Ann Street (north) vestibule/entrance of City Hall which is open to the public Monday through Friday from 8am to 5pm (except holidays). The City will not be liable to any prospective offeror for any unforeseen circumstances, delivery, or postal delays. Postmarking on the due date will not substitute for receipt of the proposal. Offerors are responsible for submission of their proposal. Additional time will not be granted to a single prospective offeror. However, additional time may be granted to all prospective offerors at the discretion of the City.

A proposal may be disqualified if the following required forms are not included with the proposal:

- **Attachment B - City of Ann Arbor Non-Discrimination Declaration of Compliance**
- **Attachment C - City of Ann Arbor Living Wage Declaration of Compliance**
- **Attachment D - Vendor Conflict of Interest Disclosure Form of the RFP Document**

Proposals that fail to provide these forms listed above upon proposal opening may be deemed non-responsive and may not be considered for award.

Please provide the forms outlined above (Attachments B, C and D) within your narrative proposal, not within the separately sealed Fee Proposal envelope.

All proposed fees, cost or compensation for the services requested herein should be provided in the separately sealed Fee Proposal envelope only.

F. DISCLOSURES

Under the Freedom of Information Act (Public Act 442), the City is obligated to permit review of its files, if requested by others. All information in a proposal is subject to disclosure under this provision. This act also provides for a complete disclosure of contracts and attachments thereto.

G. TYPE OF CONTRACT

A sample of the Professional Services Agreement is included as Appendix A. Those who wish to submit a proposal to the City are required to review this sample agreement carefully. **The City will not entertain changes to its Professional Services Agreement.**

The City reserves the right to award the total proposal, to reject any or all proposals in whole or in part, and to waive any informality or technical defects if, in the City's sole judgment, the best interests of the City will be so served.

This RFP and the selected offeror's response thereto, shall constitute the basis of the scope of services in the contract by reference.

H. NONDISCRIMINATION

All offerors proposing to do business with the City shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the Section 9:158 of the Ann Arbor City Code. Breach of the obligation not to discriminate as outlined in Attachment B shall be a material breach of the contract. Contractors are required to post a copy of Ann Arbor's Non-Discrimination Ordinance attached at all work locations where its employees provide services under a contract with the City.

I. WAGE REQUIREMENTS

The Attachments provided herein outline the requirements for payment of prevailing wages or of a "living wage" to employees providing service to the City under this contract. The successful offeror must comply with all applicable requirements and provide documentary proof of compliance when requested.

J. CONFLICT OF INTEREST DISCLOSURE

The City of Ann Arbor Purchasing Policy requires that the consultant complete a Conflict of Interest Disclosure form. A contract may not be awarded to the selected offeror unless and until the Procurement Unit and the City Administrator have reviewed the Disclosure form and determined that no conflict exists under applicable federal, state, or local law or administrative regulation. Not every relationship or situation disclosed on the Disclosure Form may be a disqualifying conflict. Depending on applicable law and regulations, some contracts may awarded on the recommendation of the City Administrator after full disclosure, where such action is allowed by law, if demonstrated competitive pricing exists and/or it is determined the award is in the best interest of the City. A copy of the Conflict of Interest Disclosure Form is attached.

K. COST LIABILITY

The City of Ann Arbor assumes no responsibility or liability for costs incurred by the offeror prior to the execution of a Professional Services Agreement. The liability of the City is limited to the terms and conditions outlined in the Agreement. By submitting a proposal, offeror agrees to bear all costs incurred or related to the preparation, submission, and selection process for the proposal.

L. DEBARMENT

Submission of a proposal in response to this RFP is certification that the Respondent is not currently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal departments or agency. Submission is also agreement that the City will be notified of any changes in this status.

M. PROPOSAL PROTEST

All protests must be in writing and filed with the Purchasing Agent within 5 business days of any notices of intent, including, but not exclusively, divisions on pre-qualification of bidders, shortlisting of bidders, or a notice of intent to award a contract. Only bidders who responded to the solicitation may file a bid protest. The offeror must clearly state the reasons for the protest. If an offeror contacts a City Service Area/Unit and indicates a desire to protest an award, the Service Area/Unit shall refer the offeror to the Purchasing Manager. The Purchasing Manager will provide the offeror with the appropriate instructions for filing the protest. The protest shall be reviewed by the City Administrator or designee, whose decision shall be final.

Any inquiries or requests regarding this procurement should be only submitted in writing to the Designated City Contacts provided herein. Attempts by the offeror to initiate contact with anyone other than the Designated City Contacts provided herein that the offeror believes can influence the procurement decision, e.g., Elected Officials, City Administrator, Selection Committee Members, Appointed Committee Members, etc., may lead to immediate elimination from further consideration.

N. SCHEDULE

The proposals submitted should define an appropriate schedule in accordance with the requirements of the Proposed Work Plan in Section III.

The following is the schedule for this RFP process.

Activity/Event	**Anticipated Date**
Written Question Deadline	March 17, 2025, 2:00 p.m. (Local Time)
Addenda Published (if needed)	On or before March 21, 2025
Proposal Due Date	April 8, 2025, 2:00 p.m. (Local Time)

Tentative Interviews (if needed)	Week of April 21, 2025
Selection/Negotiations	May/June 2025
Expected City Council Authorizations	June/July 2025

The above schedule is for information purposes only and is subject to change at the City's discretion.

O. IRS FORM W-9

The selected offeror will be required to provide the City of Ann Arbor an IRS form W-9.

P. RESERVATION OF RIGHTS

1. The City reserves the right in its sole and absolute discretion to accept or reject any or all proposals, or alternative proposals, in whole or in part, with or without cause.
2. The City reserves the right to waive, or not waive, informalities or irregularities in of any proposal if determined by the City to be in its best interest.
3. The City reserves the right to request additional information from any or all offerors.
4. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested within RFP.
5. The City reserves the right to determine whether the scope of the project will be entirely as described in the RFP, a portion of the scope, or a revised scope be implemented.
6. The City reserves the right to select one or more consultants to perform services.
7. The City reserves the right to retain all proposals submitted and to use any ideas in a proposal regardless of whether that proposal is selected. Submission of a proposal indicates acceptance by the firm of the conditions contained in this RFP, unless clearly and specifically noted in the proposal submitted.
8. The City reserves the right to disqualify proposals that fail to respond to any requirements outlined in the RFP, or failure to enclose copies of the required documents outlined within RFP.

Q. ENVIRONMENTAL COMMITMENT

The City of Ann Arbor recognizes its responsibility to minimize negative impacts on human health and the environment while supporting a vibrant community and economy. The City further recognizes that the products and services the City buys have inherent environmental and economic impacts and that the City should make procurement decisions that embody, promote and encourage the City's commitment to the environment.

The City strongly encourages potential vendors to bring forward tested, emerging, innovative, and environmentally preferable products and services that are best suited to the City's environmental principles. This includes products and services such as those with lower greenhouse gas emissions, high recycled content, without toxic substances, those with high reusability or recyclability, those that reduce the consumption of virgin materials, and those with low energy intensity.

As part of its environmental commitment, the City reserves the right to award a contract to the most responsive and responsible bidder, which includes bids that bring forward products or services that help advance the City’s environmental commitment. In addition, the City reserves the right to request that all vendors report their annual greenhouse gas emissions, energy consumption, miles traveled, or other relevant criteria in order to help the City more fully understand the environmental impact of its procurement decisions.

SECTION II - SCOPE OF SERVICES

1. Background

The Ann Arbor Landfill (AALF), located south of Ellsworth Road, west of Platt Road and north of the railroad right-of-way, is separated into two phases (see *Figure 1, Groundwater Monitoring Well Location Map*). The older phase of the landfill (Phase I) originated as an old gravel pit, which later accepted municipal and industrial waste and is located on the eastern portion of the landfill parcel. Of the approximately 110 acres, which comprise Phase I, the western third of the landfill is clay lined. The remaining easterly two-thirds are unlined allowing groundwater to come in direct contact with the refuse. The city purchased this operation in 1959. In 1984, Phase I was closed and capped. The city then began landfilling efforts within the remaining 60 acres known as Phase II. Phase II is an engineered, lined landfill with leachate and gas collection systems. In 1992, Phase II was closed and capped. The Ann Arbor Landfill holds approximately 2.75 million tons of refuse.

In the early 1990s, the city completed an investigation that discovered elevated levels of certain chemicals, including vinyl chloride and 1,4-dioxane, in the groundwater near the Phase I landfill. In response, the city first installed several purge wells to pump up the affected groundwater and discharge it through the sanitary sewer to the Water Resource Recovery Facility (WRRF). The purge wells effectively stopped the further migration of the contaminated water. In 1995-96 the city installed a 1.75-mile long “slurry wall” around 4/5ths of the closed landfill area. A slurry wall was constructed from ground level downwards until it reached impermeable clay. The slurry wall ranges from 20 to 70 feet deep and was constructed using hundreds of tons of specialized bentonite clay. The purge wells continue to remove water from the area outside the landfill. The slurry wall essentially diverts the groundwater around the landfill, instead of through the landfill. Reduction in the levels of contamination within the purge wells has been observed.

A capture zone analysis demonstrates that the three purge wells effectively capture contamination leaving the landfill, which was summarized in the report titled “Capture Zone Analysis and Conceptual Site Model Update for the Ann Arbor Landfill,” dated March 10th, 2009. Purge rates have been adjusted based on this analysis to focus capture efforts on vinyl chloride. The model was updated in 2019.

Landfill gas is managed with a wellfield collection system owned by the city. Up until 2023 the gas was recovered and used to fuel an energy producing engine. In recent years there has not been sufficient gas to make this program economically feasible. Currently, methane gas is collected and piped back to the system’s blower skid, which contains a condensation tank, two 600-pound carbon tanks, and a blower. The air from the wells is pushed through a condensation tank, where moisture in the air is condensed. The air then travels to the carbon tanks, where organic molecules adhere to the granulated active carbon before venting the cleaner air through a stack.

In addition, a methane control and collection system was installed in the spring of 2005 along a portion of the north side of the AALF. The purpose of this system was to capture methane at the landfill property boundary and prevent off-site migration. There are a total of 10 perimeter extraction wells (PEW) that are designed to capture methane gas through a well screen at the property boundary. However, these extraction wells have not been operated since 2022 due to the decrease in methane production.

SCOPE OF SERVICES

The Scope of Services for environmental monitoring and maintenance at the AALF will begin in July 2025, corresponding to the start of the City's fiscal year, and end on June 30, 2029, if the original two-year contract is optioned for two more years.

TASK 1: GROUNDWATER MONITORING PROGRAM

Groundwater monitoring consists of the collection of static groundwater elevations and groundwater samples from groundwater monitoring wells specific to individual contaminant plumes, i.e., 1,4 dioxane and vinyl chloride within the upper aquifer at the AALF. The frequency of monitoring varies from semi-annually to annually and may change based on future findings. Groundwater monitoring at the AALF shall be completed in accordance with the Ann Arbor Landfill Revised Hydrogeological Monitoring Plan, dated December 18, 2015, which can be found in Attachment G.

Task 1.1: Collection of Static Groundwater Levels

This task includes the work effort necessary to collect static water levels from 55 locations, listed in *Table 1 - Groundwater Monitoring Program*. The static water level measurement shall be obtained from each location with an electronic water level meter accurate to +/- 0.01-foot. The water level meter shall be thoroughly disinfected following each use to minimize the potential for cross contamination between sampling points. Static water levels are to be collected on a semi-annually basis in accordance with Table 1. At each monitoring well, the depth-to-water shall be recorded, referenced to the top of the well casing and used with existing information to calculate the volume of standing water in each well.

Water level data shall be used to generate a groundwater elevation contour map. This contour map, as well as static water levels collected across the slurry wall, shall be used to demonstrate that the hydraulic barrier system (slurry wall and purge wells) is maintaining an inward hydraulic gradient. If new wells are installed as part of this contract, the contractor shall work with city staff to have the new well surveyed and added to the GIS database.

Task 1.2: Sample Groundwater Monitoring Wells

Sampling shall occur in the months of April and October. Personnel conducting the sampling shall have completed the required Occupational Safety and Health Act (OSHA) safety 1910.120 training with annual refreshers. Groundwater samples that are representative of groundwater quality shall be collected at the frequency noted from the wells identified on *Table 1 - Groundwater Monitoring Program*. A map of the sample locations is included as *Figure 1 - Groundwater Monitoring Well Location Map*.

All samples obtained shall be collected in a manner to ensure results are representative of actual groundwater quality. Prior to collection of groundwater samples, water will be evacuated from each well using low flow purging techniques until a stabilized water level is achieved. The wells will be purged using peristaltic pumps. Well purging shall be accomplished using portable purge pumps or bailers. Following removal of at least three well volumes, field measurements of pH, specific conductance, oxidation reduction potential (ORP) and temperature shall be continuously recorded from water samples extracted from the well to determine if stable conditions have been achieved (i.e., two consecutive measurements of +/- 5-percent). After stable conditions have been achieved, samples representative of the groundwater shall then be collected. For wells that bail dry during purging, field measurements of pH, specific conductance, ORP and temperature shall be recorded after the well recharges.

Task 1.3: Perform Laboratory Analysis

The groundwater samples shall be placed directly into clean laboratory provided containers and stored in ice-packed coolers. Upon completion of all sampling activities, samples for 1,4-dioxane analysis shall be submitted to a laboratory, approved by the Engineer and capable of analysis using Method 522, under chain-of-custody procedures for analysis. All other groundwater samples may be submitted to an approved and certified laboratory, under chain-of-custody procedures for analysis. Analytical laboratories shall serve as subcontractors to Consultant during the duration of this project. Fees for the laboratory analysis shall be included in the fee schedule.

Analyses to be completed on groundwater samples collected from the monitoring wells shall include various inorganic and organic constituents as identified on *Table – 1 Groundwater Monitoring Program, List of Sample Locations and Analytical Parameters.* In addition to analysis of groundwater samples, various quality assurance/quality control (QA/QC) samples, including field blanks and trip blanks, shall be collected and submitted to the laboratories for analysis.

Task 1.4: Review and Analysis of Results

The consultant shall evaluate analytical data, as well as QA/QC data, supplied by the analytical laboratories. Evaluations shall include an estimation of the direction of groundwater flow, determination of general groundwater quality trends and an evaluation pertaining to the hydraulic performance of the purge wells and slurry wall.

Figure 1. Ann Arbor Landfill
Groundwater Monitoring Well Locations

⊕	Monitoring Location
- - -	Landfill Slurry Wall

W- Monitoring Well
OW- Observation Well
PW- Purge Well
P- Piezometer Well

0 250 500 1,000
US Feet

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Table 1. Groundwater Monitoring Program*				
Monitoring Wells	**SWL**	**Field Parameters**	**VOCs**	**1,4-Dioxane**
W-14-84	SA			
W-46-89	SA			
W-47-89	SA	SA	SA	SA
W-48-89	SA	SA		SA
W-50-89	SA			
W-51-89	SA			
W-64-90	SA			
W-68-90	SA	SA		SA
W-70-92R	SA			
W-72-90	SA			
W-84-92	SA	SA	SA	
W-85-92	SA	SA	SA	
W-87-92	SA	SA	SA	SA
W-88-92	SA	SA	SA	
W-89-92	SA	SA	SA	
W-90-92	SA	SA	SA	
W-92-92	SA	SA	SA	
W-94-92	SA	SA	SA	
W-96-92	SA	SA	SA	
W-99-93	SA	SA	SA	
W-100-93	SA	SA	SA	
W-101-93	SA			
W-102-93	A[1]	A[1]	A[1]	
W-105-20	SA	SA		SA
W-106-20	SA	SA		SA
W-107-20	SA	SA		SA
W-108-20	SA	SA		SA
PW-1R-12	SA	SA	SA	SA
PW-2R-22	SA	SA	SA	SA
PW-3R-12	SA	SA	SA	SA
OW-31-08	SA			
OW-32-08	SA			
OW-33-08	SA			
P-0U	SA			
P-0D	SA			
P-1U	SA			
P-1D	SA			
P-2U	SA			
P-2D	SA			
P-3U	SA			
P-3D	SA			
P-4U	SA			
P-4DR	SA			
P-5U	SA			
P-5D	SA			
P-6U	SA			
P-6D	SA			
P-7UR-05	SA			
P-7D	SA			

Table 1. Groundwater Monitoring Program*				
Monitoring Wells	**SWL**	**Field Parameters**	**VOCs**	**1,4-Dioxane**
P-8U	SA			
P-8D	SA			
P-9U	SA			
P-9D	SA			
P-10U	SA			
P-10D	SA			
Totals :	**SWL**	**Field Parameters**	**VOCs**	**1,4-Dioxane**
Semi Annually	**54**	**21**	**15**	**11**
Every 5 Years	**55**	**22**	**16**	**11**

**Notes*

- *SA = Semi-annual event: April and October*
- *A^1 = W-102-93 will be sampled annually in April every five years for VOCs. The next sampling event is April 2025.*
- *W-105-20, W-106-20, W-107-20 and W-108-20 were installed and surveyed in 2020.*
- *PW-2R-01 was replaced by PW-2R-22 in December 2022.*

Task 1.5: Prepare and Submit Monitoring Report

A copy of each semi-annual report shall be submitted to EGLE within 60-days of sample. Data presented in the report shall include groundwater contour elevation map, isoconcentration maps, analytical data summary table(s) and an evaluation regarding the hydraulic gradient across the slurry wall. These reports shall be reviewed with City staff prior to submittal to regulatory agencies.

Task 1.6: Regulatory and/or Public Meetings

This task includes preparation for and attendance at either regulatory or public meetings. It is anticipated that a total of two meetings per year for the contract duration shall be necessary. It is anticipated that the consultant will prepare various meeting agendas, overview documents, graphical representations of analytical data and prepare meeting minutes. Consultant's principal-in-charge and/or a project manager shall attend meetings.

Task 1.7: Update of Capture Zone Analysis

This task recognizes that a Capture Zone analysis was prepared and submitted to EGLE in 2010. As a result, our monitoring and groundwater extraction program were modified. The model was updated in 2019. An updated Capture Zone Analysis shall be updated during the second year of this contract.

TASK 2: LANDFILL GAS MONITORING PROGRAM

The City of Ann Arbor conducts quarterly gas monitoring surveys to fulfill the requirements of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended and the rules promulgated under Part 115 R 299.4433. Currently, quarterly gas monitoring at the AALF shall be completed in accordance with a Gas Monitoring Plan Revision, dated March 28, 2008 and Addendum to Gas Monitoring Plan Revision, dated June 4, 2021, which can be found in Attachment H. The gas monitoring locations at the AALF are depicted in *Figure 2 - Gas Monitoring Location Map*. In addition, the gas sampling locations are listed with the sample frequency in *Table 2 - Gas Sampling Location and Frequency*. The Consultant shall also complete indoor gas monitoring within buildings adjacent to the AALF as shown on *Figure 3 – Indoor Gas Monitoring Building Locations* and described in *Table 3 – Indoor Gas Monitoring Locations*.

Task 2.1: Complete Field Monitoring

Landfill gas monitoring occurs concurrently with the groundwater monitoring schedule in the months of January, April, July and October. Personnel conducting the monitoring shall have completed the required OSHA safety training. Landfill gas measurements shall be collected from the locations shown in Figures 2 and 3 and described in Tables 2 and 3.

If necessary, and when requested by the City, Consultant shall also perform methane monitoring at select locations that are not part of the normal routine quarterly monitoring locations.

Ambient methane concentrations shall be measured with a combustible gas indicator and infrared sensor. Instruments shall display the lower explosive limit (LEL) and percent by volume methane as calibrated to methane in ambient air. The meter shall be calibrated prior to each use with the accompanying calibration kit supplied by the manufacturer.

Gas monitoring data collected in the field shall be recorded on field data sheets. Information collected at each gas monitoring location shall include date, time, personnel, weather conditions, LEL, percent methane, carbon dioxide and oxygen readings. In addition, calibration information shall be recorded. In addition, to ensure the system is working, pressure readings with magnehelic gauges are taken during each methane sampling survey.

Federal and state regulations prohibit methane gas concentrations in landfill facility structures in excess of 25-percent of the LEL. The concentration of methane gas is to be measured and recorded in the site's operating record on a quarterly basis.

Figure 2. Ann Arbor Landfill
Gas Sampling Locations

⊕ Monitoring Location	R- Storm Sewer P- Piezometer W- Water Manhole
- - - Landfill Slurry Wall	GP- Gas Probe MP Meter Pit S- Sanitary Sewer TGP- Temporary Gas Probe

0 250 500 1,000
US Feet

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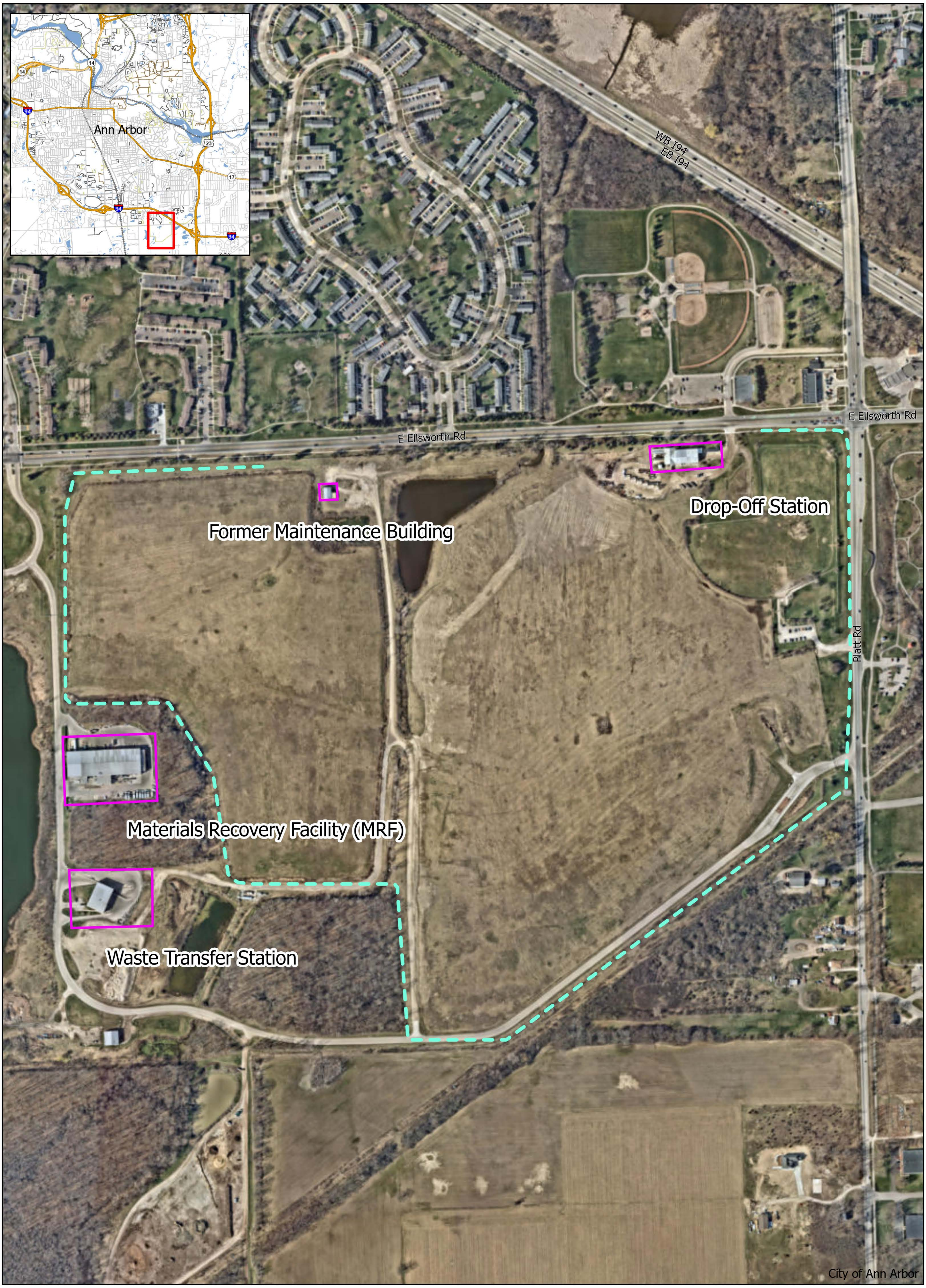

Figure 3. Ann Arbor Landfill
Indoor Gas Monitoring Building Locations

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Table 2. Gas Sampling Locations and Frequency			
Monitoring Location	**Number of Monitoring Points**	**Location as Identified on Map**	**Frequency**
Sanitary Sewer	2	S1 and S3	January and July
	5	S1, S2, S3, S5, and S6	April and October
Storm Sewer	2	R1 and R2	January and July
	3	R1, R2 and R6	October
	3	R1, R2 and R6	April
Indoor Locations*	28	MP-1 through MP-8; MP-10, MP-11, MP-14, MP-15, MP-18 through MP-33	January and July
	28	MP-1 through MP-8; MP-10, MP-11, MP-14, MP-15, MP-18 through MP-33	April and October
Gas Probes	15	GP-1S/1D through GP-5S/5D; GP-7S-98; GP-7D-98; GP-8SR-05; and GP-8D-98	January and July
	19	GP-1S/1D though GP-5S/5D;GP-6SR-99; GP-7S-98; GP-7D-98; GP-8SR-05; GP-8D-98; GP-13-99 and GP-14-02 through GP-16-02	April
	19	GP-1S/1D through GP-5S/5D; GP-6SR-99; GP-7S-98; GP-7D-98; GP-8SR-05; GP-8D-98; GP-13-99; and GP-14-02 through GP-16-02	April and October
Temporary Gas Probes	1	TGP-2	January and July
	2	TGP-1 and TGP-2	April and October
Piezometers	1	P-3U	January and July
	1	P-3U	April and October
Meter Pit	1	MP	April and October

**Indoor locations include: Materials Recover Facility (WRF), former Maintenance Building, Ann Arbor Drop-off Station, and the Waste Transfer Station as shown in Figure 3. Note that MP-30 through MP-33 are not included in current gas monitoring plan from 2021 (Attachment H).*

Table 3. Indoor Gas Sampling locations		
Building Name	**Sampling Locations**	**Total Indoor Gas Sampling Locations per Structure**
Former Maintenance Building	MP-1 through MP-5	5
Ann Arbor Drop-Off Station	MP-6 through MP-8, MP-10, MP-18 through MP-29	16
Materials Recovery Facility (MRF) Building	MP-11, MP-30 through MP-33	5
Waste Transfer Station	MP-14 and MP-15	2

Task 2.2: Prepare and Submit Monitoring Report

Quarterly monitoring reports shall review and analyze the data collected and shall be submitted to the EGLE within 60-days of gas monitoring data collection. Electronic copies shall also be submitted to the City. Data presented in the report shall include field data sheets and a summary of current and previous gas monitoring data. These reports shall be reviewed with city staff prior to submittal to regulatory agencies.

Task 2.3: Regulatory and/or Public Meetings

This task includes preparation for and attendance at either regulatory or public meetings. For budgetary purposes, it is anticipated that a total of four meetings per year for the contract duration shall be necessary. It is anticipated that the consultant shall prepare meeting agendas, overview documents, graphical representations of analytical data and meeting minutes. Meetings shall be attended by Consultant's principal-in-charge and/or a project manager.

Task 2.4: Methane Gas Collection System Monitoring

The Consultant shall complete a monthly inspection of the blower skid, located at the north side methane extraction system, and perform routine operation and maintenance. In addition, the ten perimeter extraction wells shall be inspected quarterly, which ceased operating in 2022. Given the age of the landfill, the historical data and the lack of detections within the landfill (except for GP-2S and on rare occasion, GP-2D and locations outside the drop of station), these wells may no longer be necessary. It is not unusual for gas monitoring well GP-2S in the landfill to have a methane detection, however the three gas wells across the street (GP13-99, GP-14-02 and GP-15-02) do not demonstrate migration from GP-2S. While the ten perimeter extraction wells have remained off as methane continues to diminish, it may be necessary to restart operation should methane be observed migrating from the landfill. The Consultant shall provide technical assistance to the City of Ann Arbor regarding issues related to the north side methane gas collection system.

Task 2.5: Michigan Air Emission Reporting System

The AALF has not been required to obtain an air permit, as landfills are exempt from permitting. However, EGLE may require reporting an emission inventory using the Michigan Air Reporting System (MAERS). Consultant shall, if necessary, prepare annual MAERS reports.

Task 2.6: Federal Greenhouse Gas Reporting

The AALF is currently required to report greenhouse gas emissions (GHG) annually to the US Environmental Protection Agency (EPA). The consultant shall obtain the information necessary for this reporting, review this information with city staff prior to submittal, and obtain the necessary access to the EPA electronic reporting site.

TASK 3: WASTEWATER MONITORING PROGRAM

Wastewater monitoring sampling procedures and analytical requirements are provided within the Industrial User Permit No. 20240615, dated June 15, 2024 (Attachment I). Sampling consists of the collection of quarterly wastewater samples from five wastewater discharge locations identified as:

Outfall 001: Groundwater Purge Well PW-1R-01
Outfall 003: Leachate Discharge from Manhole MH-A
Outfall 004: Leachate Discharge from Manhole MH-B
Outfall 005: Groundwater Purge Well PW-2R-01
Outfall 006: Groundwater Purge Well PW-3R-01

These outfalls, which include three purge wells and two leachate manholes are depicted in *Figure 4 - Wastewater Sampling Location Map*. In addition, monthly manual discharge readings are obtained, data evaluated, discharge volume adjusted as necessary and 1,4-dioxane mass balance calculations performed.

Task 3.1: Collection of Monthly Discharge Readings

To assure that the purge wells are functioning properly, manual monthly discharge readings shall be obtained. These readings shall be compared to automated readings to assure that the wells are functioning and that the meters and purge wells are operating properly.

Task 3.2: Collection of Quarterly Wastewater Samples

Quarterly water samples shall be collected from the five outfalls. Field measurements of pH, specific conductance, and temperature shall be recorded from water samples extracted from each sampling location.

Task 3.3: Laboratory Analysis

Samples for 1,4-dioxane analysis shall be submitted to a laboratory, approved by the Engineer and capable of Method 522, under chain-of-custody procedures for analysis. Analyses to be completed on wastewater samples collected from the outfalls shall include various inorganic and organic constituents as identified in Industrial User Permit No. 20240615, dated June 15, 2024, which can be found in Attachment I. In addition, various QA/QC samples, including field blanks, trip blanks and duplicate samples shall be collected and submitted to analytical laboratories for analysis.

Figure 4. Ann Arbor Landfill
Wastewater Sampling Locations

⊕	Meter Pit
⊕	Outfall
⊙	Sanitary Sewer
- - -	Landfill Slurry Wall

1. MH-A, MH-B, and PW-1R-12 discharge to S1
2. PW-2R-22 discharges to S2
3. PW-3R-12 discharges to S6
4. PW-1R-12 and PW-3R-12 meters are located adjacent to their wellhead

0 250 500 1,000 US Feet

N

Please see terms and conditions at a2gov.org/terms

Task 3.4: Submittal of Quarterly Reports

An electronic copy of the quarterly and annual monitoring reports shall be submitted to the City within 45-days of the sampling event. Data presented in the reports shall include field data sheets and a summary of current and previous monitoring data. These reports shall be reviewed with city staff prior to submittal to regulatory agencies. In addition, an annual report is due by July 31 of each year.

Task 3.5: Renewal of Industrial Use Permit

The Consultant shall prepare and coordinate the renewal of the Industrial Use Permit in 2029, due before June 1, 2029. In addition, an annual site inspection shall be coordinated with the City of Ann Arbor's Water Resource Recovery Facility (WRRF) staff and a laboratory of their choosing to collect representative samples for analysis. A report from this on-site inspection shall be directed to WRRF.

Task 3.6: Groundwater Remediation

The City of Ann Arbor has completed a pilot bioaugmentation project in Bicentennial Park to evaluate this method's potential effectiveness in destroying vinyl chloride in situ. The consultant must demonstrate knowledge and experience in situ remediation techniques including bioaugmentation that could support future remediation efforts for the landfill site.

TASK 4: ENVIRONMENTAL SYSTEM MAINTENANCE ACTIVITIES

In addition to the periodic sampling, the purge wells, observation wells, test wells, monitoring wells and methane detection system wells associated with the AALF require periodic maintenance. During the course of on-site activities, the Consultant shall monitor all landfill systems, evaluate periodic system maintenance needs and communicate these needs in detail to City staff. In addition, the landfill gas monitoring and methane collection system requires periodic evaluation and maintenance, and waste removal. The Consultant shall identify all required maintenance, prepare detailed cost estimates and coordinate all necessary repairs. An annual maintenance report shall be prepared and submitted electronically to the City.

TASK 5: PROJECT ADMINISTRATION AND OVERSIGHT

Consultant shall include the necessary fees to oversee and coordinate the entirety of the environmental monitoring program for the AALF. These tasks may include but are not limited to monthly progress meetings with City staff; periodic communication with the Project Manager(s) for the EGLE; troubleshooting landfill issues; and preparation of future project work plans.

Task 5.1: Landfill Inspection

Periodically EGLE will conduct an inspection of the AALF. The Consultant shall coordinate this inspection and prepare a work plan to address any deficiencies. This may include follow-up visits with EGLE staff. The Consultant shall also complete a landfill cap inspection annually, independent of the EGLE, to identify any deficiencies.

Task 5.2: Health and Safety Plan

The Consultant shall also be required to prepare and update a Health and Safety Plan. This Health and Safety Plan shall address all systems in operation at the AALF, list all emergency contact personnel, and shall be updated annually.

Task 5.3: Project Manager

The Consultant must propose a Project Manager who is available to respond in a timely matter, in the event of an emergency at the landfill. Due to the unpredictable nature of these events, the Consultant shall be reimbursed based on time and materials for required staff as bid in the contract.

Task 5.4: Deliverables

The consultant shall establish a secure website to share electronic work products with city staff. These documents include but are not limited to: the annual, quarterly and monthly reports; meeting agendas; meeting minutes; outside correspondences; and project work plans. In addition, the consultant shall assist the City in maintaining an accurate and up-to-date GIS layer of all landfill assists.

TASK 6: ENVIRONMENTAL CONSULTING SERVICES

The Consultant may be asked to assist the City under this contract with environmental tasks that are of an emergency or less predictable nature. These shall be negotiated on a case-by-case basis. Based on past experience, these may include: completing the steps necessary to obtain an approved Remedial Action Plan for the site; performing additional on-site or off-site monitoring of contamination or methane based on routine sampling results; evaluating landfill solar; developing additional off-site monitoring sites and managing well installations and sampling; developing additional on-site leachate collection systems; performing Phase I, Phase II, and baseline environmental assessments at existing or potential city owned properties; providing additional well or water sampling at city infrastructure locations including but not limited to the drinking water, stormwater, or wastewater systems; and providing consultation and document review of ACT 381 plans or other environmental remediation activities. For this proposal, the Consultant shall provide examples of the broader environmental capabilities of the firm.

SECTION III - MINIMUM INFORMATION REQUIRED

PROPOSAL FORMAT

Offerors should organize Proposals into the following Sections:

A. Professional Qualifications
B. Past Involvement with Similar Projects
C. Proposed Work Plan
D. Fee Proposal (include in a separate sealed envelope clearly marked "Fee Proposal")
E. Authorized Negotiator
F. Attachments

The following describes the elements that should be included in each of the proposal sections and the weighted point system that will be used for evaluation of the proposals.

A. Professional Qualifications – 20 points

1. State the full name and address of your organization and, if applicable, the branch office or other subsidiary element that will perform, or assist in performing, the work hereunder. Indicate whether it operates as an individual, partnership, or corporation. If as a corporation, include whether it is licensed to operate in the State of Michigan.

2. Include the name of executive and professional personnel by skill and qualification that will be employed in the work. Show where these personnel will be physically located during the time they are engaged in the work. Indicate which of these individuals you consider key to the successful completion of the project. Identify only individuals who will do the work on this project by name and title. Resumes and qualifications are required for all proposed project personnel, including all subcontractors. Qualifications and capabilities of any subcontractors must also be included.

3. State history of the firm, in terms of length of existence, types of services provided, etc. Identify the technical details that make the firm uniquely qualified for this work.

This section of the proposal will be scored based on the qualifications of the firm, its subcontractors, and personnel as described in the proposal.

B. Past involvement with Similar Projects – 30 points

The written proposal must include a list of specific experience in the project area and indicate proven ability in implementing similar projects for the firm **and** the individuals to be involved in the project. A complete list of client references must be provided for similar projects recently completed. The list shall include the firm/agency name, address, telephone number, project title, and contact person.

C. Proposed Work Plan – 30 points

Provide a detailed and comprehensive description of how the offeror intends to provide the services requested in this RFP. This description shall include, but not be limited to: how the project(s) will be managed and scheduled, how and when data and materials will be delivered to the City, communication and coordination, the working relationship between the offeror and City staff, and the company's general philosophy in regards to providing the requested services.

1. The work plan shall be sufficiently detailed and clear to identify the progress milestones (i.e., when project elements, measures, and deliverables are to be completed) and the extent and timing of the City personnel involvement. Additional project elements suggested by the Proposer are to be included in the work plan and identified as Proposer suggested elements.

2. The work plan must identify information the Proposer will need from City staff in order to complete the project. Include estimated time and resource commitment from City staff.

3. The work plan shall include any other information the Proposer believes to be pertinent but not specifically asked for elsewhere.

4. Also include in the work plan proposed steps, if any, to expedite the completion of the project. This will be given due consideration during evaluation of proposals.

Identify all of those, if any, who shall be subcontracted to assist you with this project, and the extent of work for which they shall be responsible. Include similar reference data for subcontractors and employees as requested above for the main proposer.

Include any other information that you believe to be pertinent but not specifically asked for elsewhere.

Offerors shall be evaluated on the clarity, thoroughness, and content of their responses to the above items.

D. Fee Proposal - 20 points

Fee schedules should be submitted in a separate, sealed, envelope as part of the proposal. Fee quotations are to include the names, title, hourly rates, overhead factors, and any other relevant details. The proposal should highlight key staff and positions that would likely be involved with projects. Offerors shall be capable of justifying the details of the fee proposal relative to personnel costs, overhead, how the overhead rate is derived, material and time.

E. Authorized Negotiator

Include the name, phone number, and e-mail address of persons(s) in your organization authorized to negotiate the agreement with the City.

F. Attachments

Legal Status of Offeror, Conflict of Interest Form, Living Wage Compliance Form, and the Non-Discrimination Form should be returned with the proposal. These elements should be included as attachments to the proposal submission.

PROPOSAL EVALUATION

1. The selection committee will evaluate each proposal by the above-described criteria and point system (A through C) to select a short-list of firms for further consideration. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested for evaluation. A proposal with all the requested information does not guarantee the proposing firm to be a candidate for an interview. The committee may contact references to verify material submitted by the offerors.

2. The committee then will schedule interviews with the selected firms if necessary. The selected firms will be given the opportunity to discuss in more detail their qualifications, past experience, proposed work plan and fee proposal.

3. The interview must include the project team members expected to complete a majority of work on the project, but no more than six members total. The interview shall consist of a presentation of up to thirty minutes (or the length provided by the committee) by the offeror, including the person who will be the project manager on this contract, followed by approximately thirty minutes of questions and answers. Audiovisual aids may be used during the oral interviews. The committee may record the oral interviews.

4. The firms interviewed will then be re-evaluated by the above criteria (A through D), and adjustments to scoring will be made as appropriate. After evaluation of the proposals, further negotiation with the selected firm may be pursued leading to the award of a contract by City Council, if suitable proposals are received.

The City reserves the right to waive the interview process and evaluate the offerors based on their proposals and fee schedules alone and open fee schedules before or prior to interviews.

The City will determine whether the final scope of the project to be negotiated will be entirely as described in this RFP, a portion of the scope, or a revised scope.

Work to be done under this contract is generally described through the detailed specifications and must be completed fully in accordance with the contract documents.

Any proposal that does not conform fully to these instructions may be rejected.

PREPARATION OF PROPOSALS

Proposals should have no plastic bindings but will not be rejected as non-responsive for being bound. Staples or binder clips are acceptable. Proposals should be printed double sided on recycled paper. Proposals should not be more than 30 sheets (60 sides), not including required attachments and resumes.

Each person signing the proposal certifies that they are a person in the offeror's firm/organization responsible for the decisions regarding the fees being offered in the Proposal and has not and will not participate in any action contrary to the terms of this provision.

ADDENDA

If it becomes necessary to revise any part of the RFP, notice of the addendum will be posted to Michigan Inter-governmental Trade Network (MITN) www.mitn.info and/or the City of Ann Arbor web site www.A2gov.org for all parties to download.

Each offeror must acknowledge in its proposal all addenda it has received. The failure of an offeror to receive or acknowledge receipt of any addenda shall not relieve the offeror of the responsibility for complying with the terms thereof. The City will not be bound by oral responses to inquiries or written responses other than the official written addenda.

SECTION IV - ATTACHMENTS

Attachment A – Legal Status of Offeror

Attachment B – Non-Discrimination Ordinance Declaration of Compliance Form

Attachment C – Living Wage Declaration of Compliance Form

Attachment D – Vendor Conflict of Interest Disclosure Form

Attachment E – Non-Discrimination Ordinance Poster

Attachment F – Living Wage Ordinance Poster

Attachment G – Revised Landfill Hydrogeologic Monitoring Plan (2015)

Attachment H – Revised Landfill Gas Monitoring Plan (2021)

Attachment I – Industrial User Permit (2024)

ATTACHMENT A
LEGAL STATUS OF OFFEROR

(The Respondent shall fill out the provision and strike out the remaining ones.)

The Respondent is:

- A corporation organized and doing business under the laws of the state of _____________, for whom _______bearing the office title of _____________, whose signature is affixed to this proposal, is authorized to execute contracts on behalf of respondent.*

  *If not incorporated in Michigan, please attach the corporation's Certificate of Authority

- A limited liability company doing business under the laws of the State of __________, whom _______________________ bearing the title of __________________________ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

- A partnership organized under the laws of the State of ______________ and filed with the County of ______, whose members are (attach list including street and mailing address for each.)

- An individual, whose signature with address, is affixed to this RFP.

Respondent has examined the basic requirements of this RFP and its scope of services, including all Addendum (if applicable) and hereby agrees to offer the services as specified in the RFP.

___________________________Date: ____,
Signature

(Print) Name ________________________________ Title _____________________________

Firm: ____

Address: ____

Contact Phone _____________________ Fax ______________________

Email ____________________________

ATTACHMENT B
CITY OF ANN ARBOR DECLARATION OF COMPLIANCE

Non-Discrimination Ordinance

The “non discrimination by city contractors” provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

(a) To comply with the terms of the City of Ann Arbor’s Non-Discrimination Ordinance and contract compliance administrative policy.

(b) To post the City of Ann Arbor’s Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.

(d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

____
Company Name

____
Signature of Authorized Representative Date

____
Print Name and Title

____
Address, City, State, Zip

____
Phone/Email address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor
(734) 794-6500

ATTACHMENT C
CITY OF ANN ARBOR
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than $10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than $10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than $10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here [___] No. of employees__

The Contractor or Grantee agrees:

(a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as $17.08/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than $19.04/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

Check the applicable box below which applies to your workforce

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

(b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

Company Name	Street Address
Signature of Authorized Representative Date	City, State, Zip
Print Name and Title	Phone/Email address

City of Ann Arbor Procurement Office, 734/794-6500, procurement@a2gov.org

ATTACHMENT D

VENDOR CONFLICT OF INTEREST DISCLOSURE FORM

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee ____________________________ ( ) Interest in vendor's company ( ) Other (please describe in box below)

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:		
Vendor Name	**Vendor Phone Number**	
Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, procurement@a2gov.org

ATTACHMENT E
CITY OF ANN ARBOR NON-DISCRIMINATION ORDINANCE

Relevant provisions of Chapter 112, Nondiscrimination, of the Ann Arbor City Code are included below. You can review the entire ordinance at www.a2gov.org/humanrights.

Intent: It is the intent of the city that no individual be denied equal protection of the laws; nor shall any individual be denied the enjoyment of his or her civil or political rights or be discriminated against because of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight.

Discriminatory Employment Practices: No person shall discriminate in the hire, employment, compensation, work classifications, conditions or terms, promotion or demotion, or termination of employment of any individual. No person shall discriminate in limiting membership, conditions of membership or termination of membership in any labor union or apprenticeship program.

Discriminatory Effects: No person shall adopt, enforce or employ any policy or requirement which has the effect of creating unequal opportunities according to actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight for an individual to obtain housing, employment or public accommodation, except for a bona fide business necessity. Such a necessity does not arise due to a mere inconvenience or because of suspected objection to such a person by neighbors, customers or other persons.

Nondiscrimination by City Contractors: All contractors proposing to do business with the City of Ann Arbor shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All city contractors shall ensure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon any classification protected by this chapter. All contractors shall agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of any applicable protected classification. All contractors shall be required to post a copy of Ann Arbor's Non-Discrimination Ordinance at all work locations where its employees provide services under a contract with the city.

Complaint Procedure: If any individual believes there has been a violation of this chapter, he/she may file a complaint with the City's Human Rights Commission. The complaint must be filed within 180 calendar days from the date of the individual's knowledge of the allegedly discriminatory action or 180 calendar days from the date when the individual should have known of the allegedly discriminatory action. A complaint that is not filed within this timeframe cannot be considered by the Human Rights Commission. To file a complaint, first complete the complaint form, which is available at www.a2gov.org/humanrights. Then submit it to the Human Rights Commission by e-mail (hrc@a2gov.org), by mail (Ann Arbor Human Rights Commission, PO Box 8647, Ann Arbor, MI 48107), or in person (City Clerk's Office). For further information, please call the commission at 734-794-6141 or e-mail the commission at hrc@a2gov.org.

Private Actions For Damages or Injunctive Relief: To the extent allowed by law, an individual who is the victim of discriminatory action in violation of this chapter may bring a civil action for appropriate injunctive relief or damages or both against the person(s) who acted in violation of this chapter.

THIS IS AN OFFICIAL GOVERNMENT NOTICE AND
MUST BE DISPLAYED WHERE EMPLOYEES CAN READILY SEE IT.

ATTACHMENT F

CITY OF ANN ARBOR LIVING WAGE ORDINANCE

RATE EFFECTIVE APRIL 30, 2025 - ENDING APRIL 29, 2026

$17.08 per hour	**$19.04 per hour**
If the employer provides health care benefits*	If the employer does **NOT** provide health care benefits*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than $10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

ENFORCEMENT

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than $500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed $.50 an hour for an average work week; and the employer cost or contribution must equal no less than $1/hr for the average work week.

The Law Requires Employers to Display This Poster Where Employees Can Readily See It.

For Additional Information or to File a Complaint contact
Colin Spencer at 734/794-6500 or cspencer@a2gov.org

ATTACHMENT G

ANN ARBOR REVISED HYDROGEOLOGICAL MONITORING PLAN

DECEMBER 18,2015

Ann Arbor Landfill
Revised Hydrogeological Monitoring Plan

City of Ann Arbor Landfill
Ann Arbor, Michigan

FOUNDED 1824
INCORPORATED 1851

December 18, 2015

TETRA TECH

Ann Arbor Landfill
Revised Hydrogeological Monitoring Plan

City of Ann Arbor Landfill
Ann Arbor, Michigan

Prepared for:

Matt Naud
Environmental Coordinator
City of Ann Arbor
Public Services Area
301 E. Huron
P.O. Box 8647
Ann Arbor, Michigan 48107-8647

Prepared by:

Tetra Tech
710 Avis Drive, Suite 100
Ann Arbor, Michigan 48108

December 18, 2015

Alison Rauss

Alison D. Rauss
Project Scientist

Patti J McCall

Patti J. McCall
Senior Geologist

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APPENDICES

1 INTRODUCTION AND CURRENT SAMPLING PLAN

The City of Ann Arbor Landfill (AALF) is a closed Type II landfill located at the southwest corner of Ellsworth and Platt Roads. Since 2000, groundwater samples for the AALF have been collected and analyzed in accordance with the AALF *Revised Hydrogeologic Monitoring Plan* (HMP) dated March 13, 2000 (2000 HMP), and revised in August 2000 (**Appendix A**). A summary of the sample locations and analytical parameters analyzed is provided as **Table 1**. After the fourth quarter 2012 sampling event, chloride was removed from the sampling plan based on the Michigan Department of Environmental Quality (MDEQ) approved *Capture Zone Analysis and Conceptual Site Model Update for the Ann Arbor Landfill (CZA)* Approval Letter, dated November 3, 2011.

Detection monitoring has not been required for the interior of the AALF since the installation of the hydraulic barrier system. The hydraulic barrier system currently consists of a slurry wall and two purge wells. The slurry wall surrounds the entire landfill except approximately 2,100 feet at the north side of the landfill where the two purge wells are continuously operating and maintaining capture. A third purge well, PW-2R-01 is located in Southeast Area Park and is not currently operating. This purge well is an integral component of the City's contingency plan and can be turned on when necessary.

2 PROPOSED REVISION TO THE HYDROGEOLOGICAL MONITORING PLAN

During discussions with the MDEQ regarding the *City of Ann Arbor Landfill Offsite Remedial Action Plan* (RAP) submitted March 18, 2013, it was recommended that the City submit proposed changes to the HMP and well abandonments during the RAP approval process. A draft version of the *Ann Arbor Landfill Revised Hydrogeological Monitoring Plan* was submitted on June 24, 2013 and wells proposed for abandonment were submitted in the draft *Well Abandonment Plan* dated June 17, 2013. This document replaces the draft document submitted in June 2013 and represents the final *Ann Arbor Revised Hydrogeological Monitoring Plan*. The final version of the *Well Abandonment Plan* is also being submitted on December 18, 2015.

The proposed changes to the hydrogeological monitoring program are outlined in **Table 2** and described below. The wells proposed for abandonment have been removed from **Table 2**.

2.1 Static Water Levels

In accordance with the 2000 HMP, static water levels are obtained quarterly from 72 locations: 37 groundwater monitoring wells, 22 piezometers, eight observation wells, four purge wells and one test well (**Table 1**). On June 17, 2013 the City of Ann Arbor submitted the draft *Well Abandonment Plan* requesting abandonment of 23 wells associated with the Ann Arbor Landfill. The 2000 HMP static water locations are included on **Figure 1**. The proposed HMP static water levels will be obtained semi-annually (April and October) from 50 locations: 22 groundwater monitoring wells, 22 piezometers, three observation wells and three purge wells. These static water levels will be used to calculate groundwater elevations and prepare groundwater contour maps to evaluate flow at the AALF and Southeast Area Park. Groundwater elevation data for the piezometers will be used to evaluate the effectiveness of the slurry wall; that is to ensure that the upgradient groundwater flows around the landfill rather than into the landfill.

In preparation for well abandonments Tetra Tech personnel reviewed historical and electronic databases to determine if any potential monitoring wells could exist that the City of Ann Arbor is unaware of; that is, monitoring wells that may have been installed decades ago that were either thought to have been abandoned or were forgotten about with the changes in personnel on the project. The location of historical wells in the database, for which there is not an abandonment log, were estimated in GIS or were located within the City’s CAD database. The City of Ann Arbor surveyor and Tetra Tech personnel were onsite in October 2015 with survey equipment and located seven monitoring wells. Five of these were proposed for abandonment. The remaining two monitoring wells, W-99-93 and W-102-93 will be added to the HMP. A static water level measurement will be obtained from W-99-93 semi-annually (April and October). A static water level measurement will be attempted from monitoring well W-102-93 every five years in April for a total of 51 locations. This will begin in April 2020. The proposed static water level locations are included on **Figure 2**.

Static water levels will be measured using an electronic water level meter from the top of casing of each well. All water levels will be measured within a 24 hour timeframe. The water level meter will be thoroughly rinsed with alconox and distilled water following each use to minimize the potential for cross contamination between wells.

2.2 Hydrogeological Monitoring Plan

In accordance with the 2000 HMP, groundwater samples were collected quarterly (January, July) semi-annually (April) and annually (October). The current HMP sampling locations are depicted on **Table 1** and **Figure 1**. For the proposed revision to the HMP, the City of Ann Arbor requests a semi-annual (April and October) sampling schedule.

2.2.1 Chloride

In accordance with the 2000 HMP, 12 wells were sampled semi-annually and 15 wells annually for chloride. Based on the MDEQ approval letter dated November 3, 2011 for the CZA, chloride sampling was removed from the sampling plan after the fourth quarter 2012 groundwater sampling event. Based on MDEQ approval, chloride is not included in this revised HMP.

2.2.2 1,4-Dioxane

In accordance with the 2000 HMP, 15 wells were sampled semi-annually and 20 wells annually for 1,4-dioxane. The 1,4-dioxane plume is below all applicable MDEQ criteria offsite but is detected above the MDEQ Part 201 Residential Drinking Water (DW) Criteria of 85 micrograms/liter (ug/L) in the onsite purge well PW-1R-12. Based on discussions with the MDEQ and the current size and location of the 1,4-dioxane plume, the revised HMP will include sampling of 1,4-dioxane at PW-1R-12 semi-annually. This purge well generally has concentrations of 1,4-dioxane between 120 and 150 ug/L and appears to have a consistent source. The CZA demonstrated full capture at the landfill boundary with PW-1R-12 and PW-3R-12 pumping at a combined rate of approximately 20 gallons per minute (gpm). The combined rate is currently 70-gpm in order to remediate Southeast Area Park.

Since submittal of the draft HMP in 2013, concentrations of 1,4-dioxane have been increasing in PW-3R-12. The October 2014 and April 2015 data exceeded the Part 201 DW Criteria. The increase is believed to be from increased capture of the 1,4-dioxane plume by PW-3R-12 due to well replacement and recent maintenance activities. Due to the increases in 1,4-dioxane concentrations, purge well PW-3R-12 will be added to the HMP for semi-annual sampling of 1,4-dioxane.

At the MDEQ's request, the City will continue to sample 1,4-dioxane at three additional locations north of the AALF as a contingency plan to detect if capture is lost at the landfill boundary. These locations are W-47-89, W-87-92, and PW-2R-01. A map depicting the 2000 HMP sample locations is included as **Figure 3**. Changes to the plan are depicted including proposed well abandonments and proposed 1,4-dioxane sample locations. The most recent annual 1,4-dioxane sampling data (October 2014) are included with the three most recent data points for each well location. Depending on the sampling frequency (semi-annual or annual) of the well location, the data ranges from October 2011 to October 2014.

In addition to the compliance sampling, the two monitoring wells (W-99-93 and W-102-93) that were located with survey equipment in October 2015 were sampled in November 2015 for 1,4-dioxane. Both well locations are included on **Figure 3** and were non-detect.

2.2.3 Volatile Organic Compounds

In accordance with the 2000 HMP, ten wells are sampled quarterly for volatile organic compounds (VOCs). Vinyl chloride comprises the majority of the VOC detections related to the AALF. Based on discussions with the MDEQ and the current vinyl chloride concentrations, 15 wells are proposed for semi-annual VOC sampling. These wells are included on **Table 2** and **Figure 4**. Changes to the plan include adding monitoring wells W-47-89, W-85-92, W-88-92, W-92-92, W-94-92 and the newly located monitoring well W-99-93. Monitoring well W-102-93 that was also recently discovered, will be sampled every five years in April due to its location. Monitoring well W-86-92 that has been sampled per the 2000 HMP, is proposed for abandonment. A figure depicting the proposed VOC sample locations is included on **Figure 4**. This figure includes recent historical data for monitoring wells currently sampled. In addition to routine compliance monitoring data, **Figure 4** includes information that was collected from non-compliance locations for activities related to the RAP. In September 2013, existing monitoring wells W-92-92 and W-94-92 were sampled for VOCs to demonstrate the extent of the vinyl chloride plume. Also included are the results of three temporary monitoring wells (GP-02-13, GP-03-13 and GP-04-13) that were installed and sampled in September 2013 to determine if restrictive deed covenants were needed north of the temporary monitoring well locations. In November 2015, the two monitoring wells that were located during survey, W-99-93 and W-102-93 were sampled for VOCs. All seven sample locations were non-detect for VOCs. Monitoring wells selected for VOC sampling will serve as sentinel wells or for sampling the recovery efforts within the vinyl chloride plume.

3 CONTINGENCY PLANNING AND REVISIONS TO THE HYDROGEOLOGICAL MONITORING PLAN

This revised HMP will adequately monitor the 1,4-dioxane and vinyl chloride plumes. If monitoring wells selected as sentinel locations have two consecutive sampling events with detections, the monitoring plan will be adjusted to include additional wells to monitor the plume. The City requests the ability to adjust the monitoring plan as necessary based on the data evaluation. Prior to adjusting the monitoring plan, the City will consult with and obtain approval from the MDEQ. The contingency plan may include installing monitoring wells beyond the existing sentinel wells.

Purge well PW-2R-01, located within Southeast Area Park is currently not an active pumping well. However, if the vinyl chloride plume were to migrate or PW-1R-12 or PW-3R-12 were inoperable, PW-2R-01 can be turned on to recover groundwater. Prior to 2009 when the CZA demonstrated that PW-2R-01 was not needed for recovery of the vinyl chloride plume, it was operating at 50 to 55-gpm.

If continued monitoring indicates the RAP is achieving the cleanup objectives, the City will request modifications to the sampling plan and monitoring well abandonment as appropriate.

4 GROUNDWATER MONITORING WELL SAMPLE COLLECTION

Groundwater samples will continue to be collected using the current techniques at the AALF. The majority of the AALF monitoring wells have dedicated well wizard micropurge pumps for low-flow sampling. Water is purged until a stabilized water level and stabilized field parameters are achieved. Field parameters, including pH, specific conductance, temperature, oxidation-reduction potential (ORP) and dissolved oxygen are recorded until the readings are within 10-percent of one another. When stabilized field parameters are achieved, groundwater samples are collected.

For wells without dedicated well wizard pumps, samples will be collected with peristaltic pumps or bailers. Field measurements will be recorded and purging will continue until readings stabilize to within 10-percent of one another.

Purge wells PW-1R-12, PW-2R-01 and PW-3R-12 contain gate valves that are connected to the effluent groundwater discharges. These gate valves allow for a diversion of a portion of the effluent groundwater from the sanitary discharge pipe to a sample port for sample collection.

The groundwater samples will be placed directly into clean laboratory provided containers and placed into ice-packed coolers. Upon completion of all sampling activities, the sample containers will be picked up by a laboratory courier or delivered to the laboratory for appropriate analysis. All samples will be handled under the proper chain-of-custody procedures. The proposed HMP is illustrated on **Figure 5**, including wells for static water level measurements, 1,4-dioxane analysis and VOC analysis.

For each sampling event, one field blank will be collected and one trip blank will be provided and analyzed for VOCs by the laboratory.

5 SUMMARY

This revised HMP will allow the City of Ann Arbor to monitor the appropriate wells and parameters related to the existing 1,4-dioxane and VOC plumes from the AALF. Approval of this sampling plan was granted by MDEQ for implementation in July 2014, while the RAP is still under MDEQ review.

AALF groundwater reports will be produced and submitted to the MDEQ after each semi-annual sampling event (April and October). The reports will be submitted no later than 30 days after the end of the calendar quarter, in accordance with R299.4907(11) of Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 Public Act 451, as amended.

TABLES

TABLE 1

Current Groundwater Monitoring Program

Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Wells	SWL	Field Parameters	VOCs	Chloride	1,4-Dioxane
W-14-84	Q				
W-37A-88	Q				
W-44-89	Q				
W-46-89	Q				
W-47-89	Q	SA			SA
W-48-89	Q	SA		SA	SA
W-49-89**	Q	A		A	A
W-50-89	Q	A		A	A
W-51-89	Q	A		A	A
W-55-90	Q				
W-64-90	Q				
W-68-90	Q	SA		SA	SA
W-70-92	Q				
W-72-90	Q				
W-76-91	Q	SA		SA	SA
W-77-91	Q	SA		SA	SA
W-78-91	Q				
W-81-91	Q				
W-83-91**	Q	A			A
W-84-92	Q	Q	Q		
W-85-92	Q				
W-86-92	Q	Q	Q	SA	SA
W-87-92	Q	Q	Q		
W-88-92	Q				
W-89-92	Q	Q	Q		SA
W-90-92	Q	Q	Q	SA	SA
W-91-92	Q				
W-92-92	Q				
W-93-92	Q				
W-94-92	Q	SA		SA	SA
W-95-92	Q	SA		SA	SA
W-96-92	Q	Q	Q	SA	SA
W-100-93	Q	Q	Q		SA
W-101-93	Q				
W-104-94**	Q	A			A
PW-1R-12	Q	Q	Q	SA	SA
PW-2R-01	Q	Q	Q	SA	SA
PW-3R-12	Q	Q	Q	SA	SA
PW-4	Q				
TW-1	Q				
OW-2	Q				
OW-7	Q				
OW-15	Q				
OW-24	Q				
OW-25	Q				
OW-31-08	Q				
OW-32-08	Q				
OW-33-08	Q				
P-0U	Q				
P-0D	Q				
P-1U	Q				
P-1D	Q				
P-2U	Q				
P-2D	Q				
P-3U	Q				
P-3D	Q				
P-4U	Q				
P-4D	Q				
P-5U	Q				
P-5D	Q				
P-6U	Q				
P-6D	Q				
P-7UR-05	Q				
P-7D	Q				
P-8U	Q				
P-8D	Q				
P-9U	Q				
P-9D	Q				
P-10U	Q				
P-10D	Q				
MW-500-07	Q				
MW-501-07	Q				
Totals :			**VOCs**	**Chloride**	**1,4- Dioxane**
Quarterly			**10**	**0**	**0**
Semi Annually			**10**	**12**	**15**
Annually			**10**	**15**	**20**

** Well is screened in the lower aquifer.
Q = Quarterly event: January and July
SA = Semi-annual event: April and October
A = Annual event: October

Chloride sampling was discontinued based on the MDEQ approval letter dated November 3, 2011 for the Capture Zone Analysis and Conceptual Site Model Update for the City of Ann Arbor Landfill following the 4th quarter 2012 sampling event.

TABLE 2

Proposed Revisions to Hydrogeological Monitoring Program

Ann Arbor Landfill
Ann Arbor, Michigan

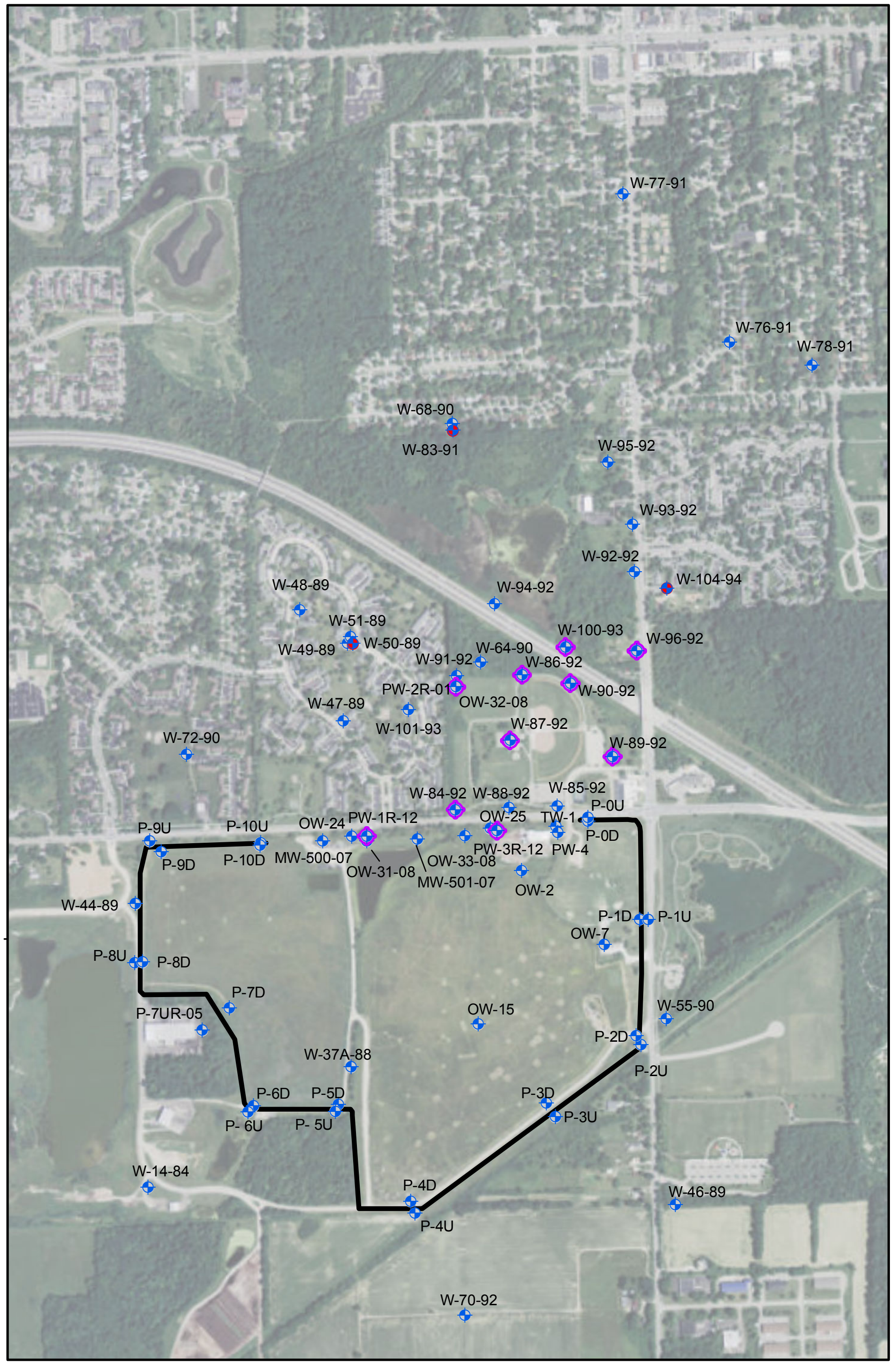
Monitoring Wells	SWL	Field Parameters	VOCs	1,4-Dioxane
W-14-84	SA			
W-46-89	SA			
W-47-89	SA	SA	SA	SA
W-48-89	SA			
W-50-89	SA			
W-51-89	SA			
W-64-90	SA			
W-68-90	SA			
W-70-92	SA			
W-72-90	SA			
W-84-92	SA	SA	SA	
W-85-92	SA	SA	SA	
W-87-92	SA	SA	SA	SA
W-88-92	SA	SA	SA	
W-89-92	SA	SA	SA	
W-90-92	SA	SA	SA	
W-92-92	SA	SA	SA	
W-94-92	SA	SA	SA	
W-96-92	SA	SA	SA	
W-99-93	SA	SA	SA	
W-100-93	SA	SA	SA	
W-101-93	SA			
W-102-93	A^1	A^1	A^1	
PW-1R-12	SA	SA	SA	SA
PW-2R-01	SA	SA	SA	SA
PW-3R-12	SA	SA	SA	SA
OW-31-08	SA			
OW-32-08	SA			
OW-33-08	SA			
P-0U	SA			
P-0D	SA			
P-1U	SA			
P-1D	SA			
P-2U	SA			
P-2D	SA			
P-3U	SA			
P-3D	SA			
P-4U	SA			
P-4D	SA			
P-5U	SA			
P-5D	SA			
P-6U	SA			
P-6D	SA			
P-7UR-05	SA			
P-7D	SA			
P-8U	SA			
P-8D	SA			
P-9U	SA			
P-9D	SA			
P-10U	SA			
P-10D	SA			
Totals :	**SWL**		**VOCs**	**1,4-Dioxane**
Semi Annually	**50**		**15**	**4**
Every 5 Years	**51**		**16**	**4**

SA = Semi-annual event: April and October

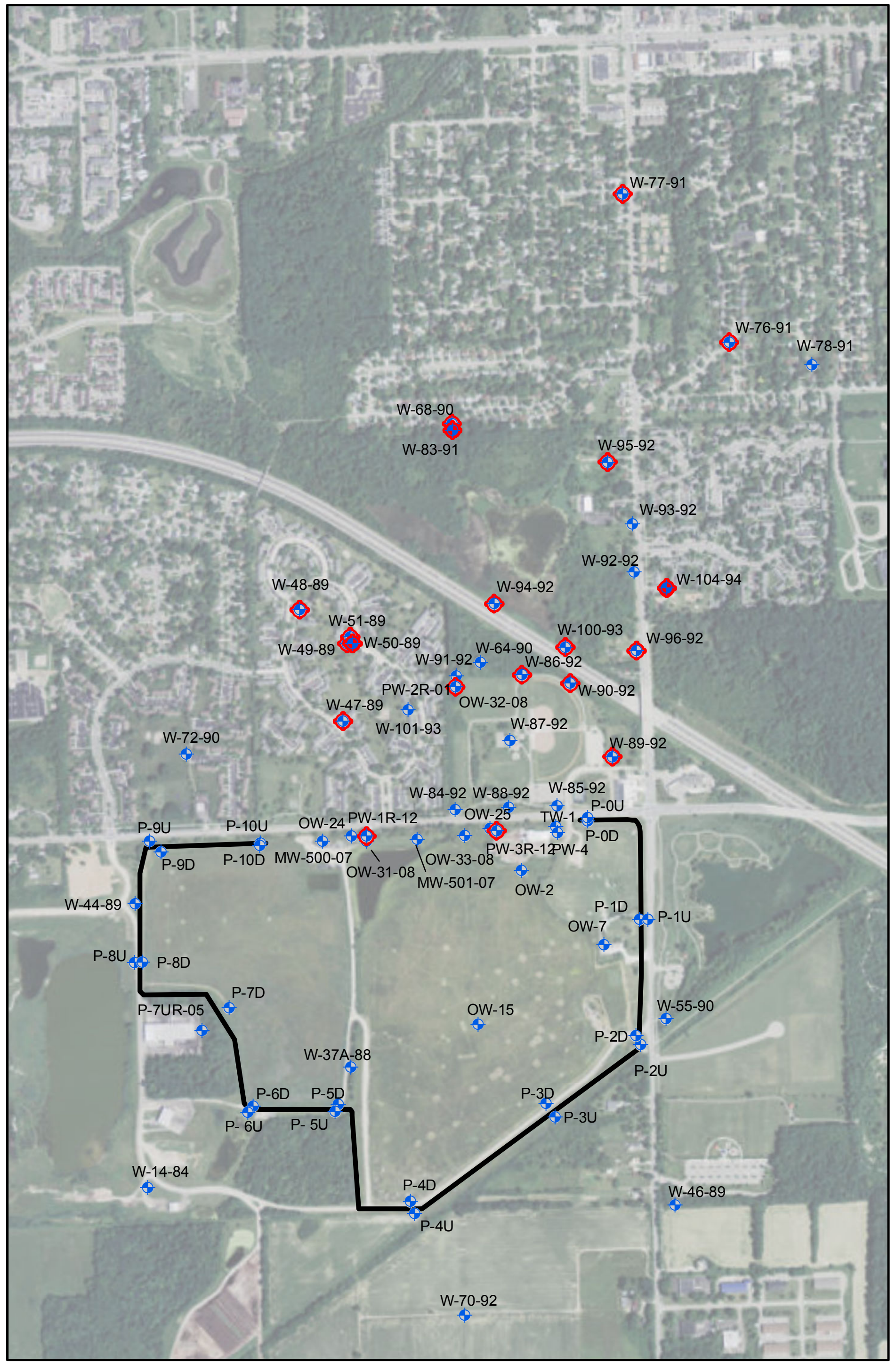
A^1 = Monitoring well W-102-93 will be sampled annually in April every five years for VOCs. The first sample was collected in November, 2015. The next sampling is April, 2020.

FIGURES

P:\...\Ann Arbor\Landfill\GIS\Figures\HMP\Figure 1_2000 HMP Sample Locations_REV



VOC Sample Locations



1,4-Dioxane Sample Locations

Chloride Sample Locations

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

◆ Lower Aquifer Monitoring Well
◆ Upper Aquifer Monitoring Well
— Slurry Wall*

◆ Monitoring Well Sampled For VOCs
◆ Monitoring Well Sampled For 1,4-Dioxane
◆ Monitoring Well Sampled For Chloride

PW-1R-12	Purge Well Location
W-84-92	Monitoring Well Location
OW-2	Observation Well Location
TW-1	Test Well Location
P-1D	Piezometer Well Location

Notes:
1. Slurry wall location is approximate.
2. VOCs = volatile organic compounds

N

0 1,250 2,500 Feet

TETRA TECH

CHECKED BY: PJM DATE: 12/15/2015

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

2000 HYDROGEOLOGICAL MONITORING PLAN
SAMPLE LOCATIONS

FIGURE
1

P:\..\Ann Arbor\Landfill\GIS\Figures\HMP\Figure 2_Proposed Static Water Level Locations_REV.mxd

Source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

◆	Upper Aquifer Monitoring Well
—	Slurry Wall*

PW-1R-12	Purge Well Location
W-84-92	Monitoring Well Location
OW-2	Observation Well Location
P-1D	Piezometer Well Location

N

0 500 1,000 Feet

*Slurry Wall Location Is Approximate
Scale is 1:10,000

TETRA TECH

CHECKED: PJM

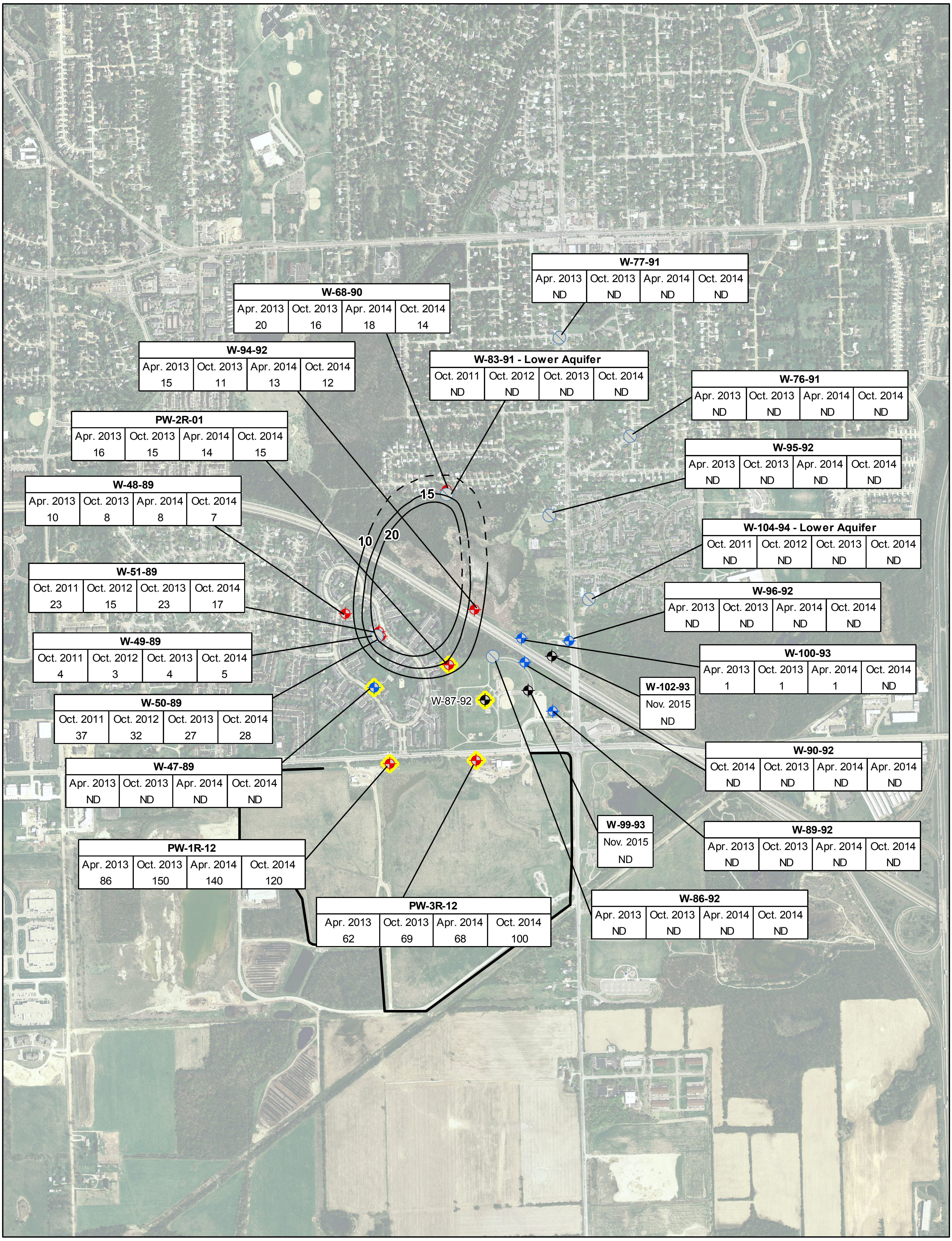
DATE: 12/15/2015

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

PROPOSED STATIC WATER LEVEL LOCATIONS

FIGURE
2

P:\Projects\Ann Arbor\Landfill\GIS\Figures\HMP\Figure 3_Proposed 1,4-Dioxane Changes to Sample Locations.mxd



W-77-91

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
ND	ND	ND	ND

W-68-90

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
20	16	18	14

W-94-92

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
15	11	13	12

W-83-91 - Lower Aquifer

Oct. 2011	Oct. 2012	Oct. 2013	Oct. 2014
ND	ND	ND	ND

W-76-91

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
ND	ND	ND	ND

PW-2R-01

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
16	15	14	15

W-95-92

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
ND	ND	ND	ND

W-48-89

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
10	8	8	7

W-104-94 - Lower Aquifer

Oct. 2011	Oct. 2012	Oct. 2013	Oct. 2014
ND	ND	ND	ND

W-51-89

Oct. 2011	Oct. 2012	Oct. 2013	Oct. 2014
23	15	23	17

W-96-92

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
ND	ND	ND	ND

W-49-89

Oct. 2011	Oct. 2012	Oct. 2013	Oct. 2014
4	3	4	5

W-100-93

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
1	1	1	ND

W-102-93

Nov. 2015
ND

W-50-89

Oct. 2011	Oct. 2012	Oct. 2013	Oct. 2014
37	32	27	28

W-47-89

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
ND	ND	ND	ND

W-90-92

Oct. 2014	Oct. 2013	Apr. 2014	Apr. 2014
ND	ND	ND	ND

W-99-93

Nov. 2015
ND

W-89-92

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
ND	ND	ND	ND

PW-1R-12

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
86	150	140	120

PW-3R-12

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
62	69	68	100

W-86-92

Apr. 2013	Oct. 2013	Apr. 2014	Oct. 2014
ND	ND	ND	ND

SOURCE: Washtenaw County, 2005

- ⊘ Monitoring Well Proposed For Abandonment
- ⊕ Monitoring Well With No Detectable Concentrations Of 1,4-Dioxane
- ⊕ Monitoring Well With Detectable Concentrations Of 1,4-Dioxane
- ⊕ Monitoring Well Not Part of Current HMP
- ◇ Monitoring Well Proposed For 2015 HMP 1,4-Dioxane Sampling
- ━ Slurry Wall*
- ― October 2014 Isoconcentration Contour Line

N

0 500 1,000 2,000 Feet

Notes:

1. All units expressed in ug/L
2. ND = below current reporting limit
3. *Slurry Wall Location is Approximate.
4. All wells for the 2015 proposed HMP are in the upper aquifer.
5. PW-1R-12, PW-3R-12, W-49-89 and lower aquifer wells were not used for contouring.
6. The 2000 HMP sample locations are depicted with changes to the sampling plan.
7. The most recent annual sampling is depicted with the three previous sampling event results.
8. Monitoring well W-87-92 was not part of the 2000 HMP for 1,4-dioxane sampling, therefore historical data does not exist.

TETRA TECH

CHECKED: PJM

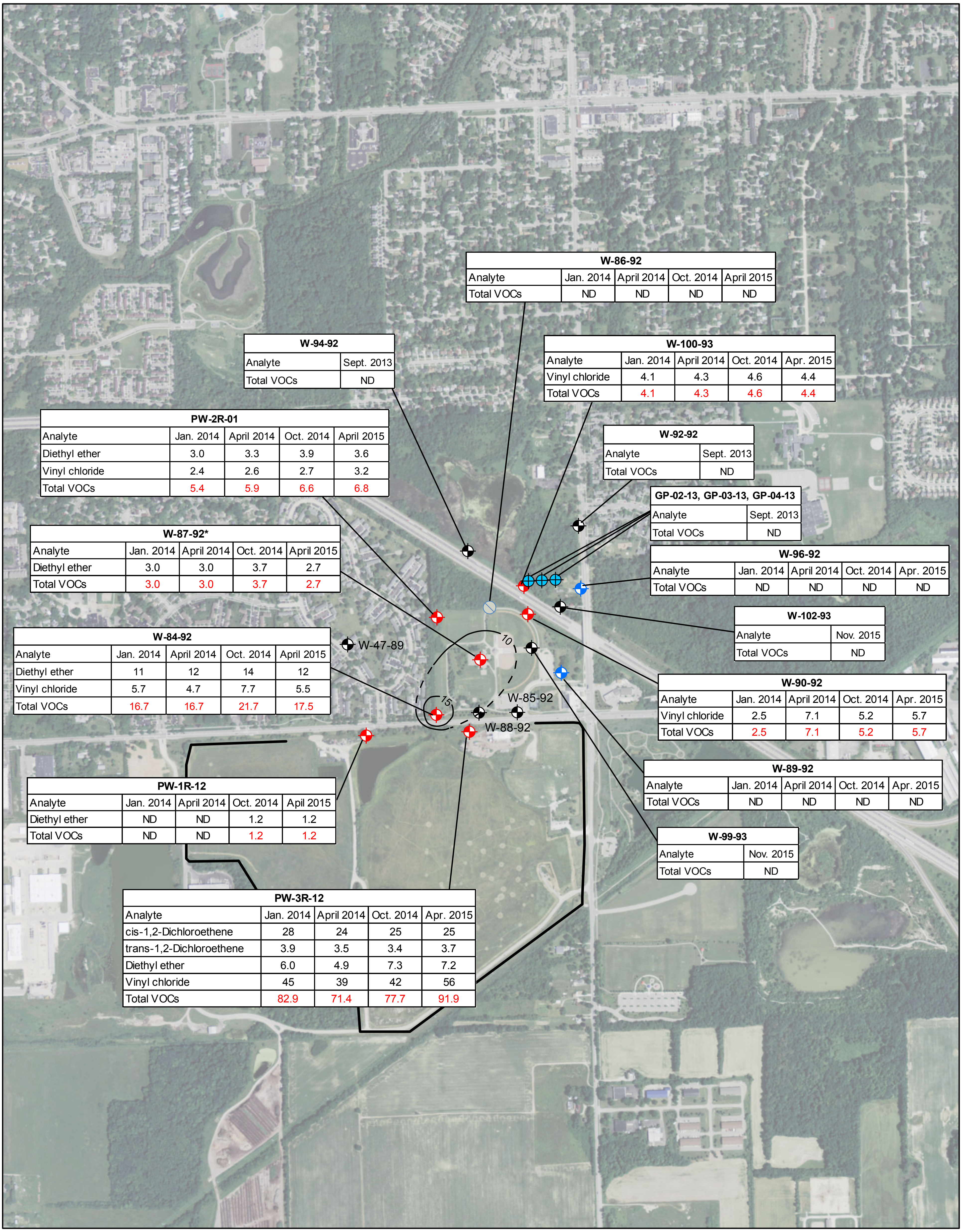
DATE: 12/17/2015

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

PROPOSED 1,4-DIOXANE CHANGES TO SAMPLE LOCATIONS

FIGURE
3

P:\Projects\Ann Arbor\Landfill\GIS\Figures\HMP\Figure 4_Proposed Hydrogeological Monitoring Plan For VOCs_REV.mxd



W-86-92

Analyte	Jan. 2014	April 2014	Oct. 2014	April 2015
Total VOCs	ND	ND	ND	ND

W-94-92

Analyte	Sept. 2013
Total VOCs	ND

W-100-93

Analyte	Jan. 2014	April 2014	Oct. 2014	Apr. 2015
Vinyl chloride	4.1	4.3	4.6	4.4
Total VOCs	4.1	4.3	4.6	4.4

PW-2R-01

Analyte	Jan. 2014	April 2014	Oct. 2014	April 2015
Diethyl ether	3.0	3.3	3.9	3.6
Vinyl chloride	2.4	2.6	2.7	3.2
Total VOCs	5.4	5.9	6.6	6.8

W-92-92

Analyte	Sept. 2013
Total VOCs	ND

GP-02-13, GP-03-13, GP-04-13

Analyte	Sept. 2013
Total VOCs	ND

W-87-92*

Analyte	Jan. 2014	April 2014	Oct. 2014	April 2015
Diethyl ether	3.0	3.0	3.7	2.7
Total VOCs	3.0	3.0	3.7	2.7

W-96-92

Analyte	Jan. 2014	April 2014	Oct. 2014	Apr. 2015
Total VOCs	ND	ND	ND	ND

W-102-93

Analyte	Nov. 2015
Total VOCs	ND

W-84-92

Analyte	Jan. 2014	April 2014	Oct. 2014	April 2015
Diethyl ether	11	12	14	12
Vinyl chloride	5.7	4.7	7.7	5.5
Total VOCs	16.7	16.7	21.7	17.5

W-90-92

Analyte	Jan. 2014	April 2014	Oct. 2014	Apr. 2015
Vinyl chloride	2.5	7.1	5.2	5.7
Total VOCs	2.5	7.1	5.2	5.7

W-89-92

Analyte	Jan. 2014	April 2014	Oct. 2014	Apr. 2015
Total VOCs	ND	ND	ND	ND

PW-1R-12

Analyte	Jan. 2014	April 2014	Oct. 2014	Apil 2015
Diethyl ether	ND	ND	1.2	1.2
Total VOCs	ND	ND	1.2	1.2

W-99-93

Analyte	Nov. 2015
Total VOCs	ND

PW-3R-12

Analyte	Jan. 2014	April 2014	Oct. 2014	Apr. 2015
cis-1,2-Dichloroethene	28	24	25	25
trans-1,2-Dichloroethene	3.9	3.5	3.4	3.7
Diethyl ether	6.0	4.9	7.3	7.2
Vinyl chloride	45	39	42	56
Total VOCs	82.9	71.4	77.7	91.9

Base Map Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

- ⊕ Monitoring Well Proposed For 2015 HMP VOC Sampling
- ⊕ Monitoring Well With No Detectable VOC Concentrations
- ⊕ Monitoring Well With Detectable VOC Concentrations
- ⊘ Monitoring Well Proposed For Abandonment
- ⊕ Temporary Monitoring Well
- ━ Slurry Wall^3
- — April 2015 Isoconcentration Contour Line

N

0 500 1,000 Feet

Notes:
1. All units expressed in ug/L
2. ND = below current reporting limit
3. Slurry wall location is approximate.
4. Total Volatile Organic Compounds (VOCs) do not include 1,4-Dioxane concentrations.
5. PW-1R-12 and PW-3R-12 are not used for contouring.
6. Total detectable VOC concentrations are depicted in red.
7. *W-87-92 was not used for contouring. This well is located in the area where a bioremediation pilot test was conducted. These results are localized.
8. W-102-93 will be sampled every five years.
9. All existing wells on this figure will be sampled as part of the 2015 proposed HMP.

TETRA TECH

CHECKED: PJM

DATE: 12/17/2015

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

PROPOSED HYDROGEOLOGICAL MONITORING PLAN FOR VOCS

FIGURE
4

P:\..\Ann Arbor\Landfill\GIS\Figures\HMP\Figure 5_Revised HMP Sample Locations_REV.mxd

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

◆ Upper Aquifer Monitoring Well

◆ Monitoring Well Sampled for VOCs

◆ Monitoring Well Sampled for VOCs and 1,4-Dioxane

◆ Monitoring Well Sampled for VOCs (Sampled Every 5 Years)

— Slurry Wall*

PW-1R-12	Purge Well Location
W-84-92	Monitoring Well Location
OW-2	Observation Well Location
P-1D	Piezometer Well Location

N

0 500 1,000 Feet

Notes:
1. Slurry wall location is approximate.
2. Monitoring wells will be sampled semi-annually (April and October) for indicated parameters.
3. Monitoring well W-102-93 will be sampled annually in April for VOCs every 5 years.
4. VOCs = volatile organic compounds.

TETRA TECH

CHECKED: PJM

DATE: 12/17/2015

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

REVISED HYDROGEOLOGIC MONITORING PLAN SAMPLE LOCATIONS

FIGURE

5

APPENDICES

APPENDIX A

AALF Hydrogeologic Monitoring Plan (HMP) dated March 13, 2000, and revised July 12, 2000, September 18, 2000 and September 27, 2000

STATE OF MICHIGAN

JOHN ENGLER, Governor
DEPARTMENT OF ENVIRONMENTAL QUALITY
"Better Service for a Better Environment"
HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973
INTERNET: www.deq.state.mi.us
RUSSELL J. HARDING, Director

COPY

REPLY TO:
JACKSON DISTRICT OFFICE
STATE OFFICE BUILDING
301 E LOUIS GLICK HWY
JACKSON MI 49201-1556

October 13, 2000

Mr. John Newman
City of Ann Arbor
100 North Fifth Avenue
P.O. Box 8647
Ann Arbor, Michigan 48104

Dear Mr. Newman:

Subject: City of Ann Arbor Landfill
Revised Hydrogeologic Monitoring Plan
Remedial Action Plan

Department of Environmental Quality (DEQ) Waste Management Division (WMD) staff have reviewed the Revised Hydrogeologic Monitoring Plan for the City of Ann Arbor Landfill, dated March 13, 2000, and revised on July 12, 2000, September 18, 2000, and September 27, 2000 (Plan). The Plan was prepared by Insight Environmental on behalf of the City of Ann Arbor Landfill.

The Plan is approved, and as agreed to on July 12, 2000, the sampling aspects were implemented during the July 2000 sampling event. Further discussions led to the development of a revised list and map describing the wells to be abandoned, which were submitted on September 18 and September 27, 2000, respectively.

In October 1996, City of Ann Arbor (the City) representatives submitted for review, the Feasibility Study/Remedial Action Plan for the Treatment of Impacted Off-Site Groundwater (Off-Site RAP). Soon thereafter, the City requested WMD to suspend review of this document, pending discussions regarding the pre-treatment of the 1, 4-dioxane in the purged groundwater prior to discharge to the City of Ann Arbor sanitary sewer system, treatment at the City's wastewater treatment plant (WWTP), and ultimate discharge to the receiving surface water body. Several years prior, the City had implemented an approved Interim Response for the off-site contaminated groundwater, in the form of a purge system that discharged directly to the sanitary sewer system with treatment at the WWTP and discharge to the surface water. The alternative selected in the Off-Site RAP is to continue operation of the Interim Response. The WMD believes that the time passed has been sufficient to decide on the treatment and fate of the purged groundwater. Please inform this office by October 31, 2000, of the City's intentions for proceeding on this matter.

If you have any questions, please call.

Sincerely,

Patrick J Brennan

Patrick J. Brennan
Geologist
Jackson District WMD
517-780-7935

pjb:red

cc: Mr. John Craig, DEQ
Ms. Carolyn B. Parker, DEQ

REVISED HYDROGEOLOGIC MONITORING PLAN

CITY OF ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

MARCH 13, 2000

Prepared for:

John Newman
City of Ann Arbor
100 North Fifth Avenue
Ann Arbor, Michigan 48104

Prepared by:

Insight Environmental Services, Inc.
2123 Pless Drive
Brighton, Michigan 48114

Project #2357

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1.0 Introduction

The City of Ann Arbor (City) owns and maintains a Type II sanitary landfill located in the City of Ann Arbor, Michigan. This landfill is known as the City of Ann Arbor Landfill (AALF). All phases of the landfill have been closed and capped. Groundwater monitoring at the AALF is presently being performed in accordance with a monitoring program identified as the Interim Groundwater Monitoring Program (IGWMP), dated June 1994 (as amended, April 1995). The locations of groundwater monitoring wells at the AALF are depicted on Figure 1, Map of Existing Groundwater Monitoring Sampling Locations. Wells which are part of the existing IGWMP are identified on Figure 1 with a rectangle surrounding the well number.

Groundwater monitoring at the AALF currently consists of quarterly collection of static groundwater elevations and groundwater samples from numerous locations. Review of hydrogeologic data collected as part of the IGWMP has lead to an understanding of the distribution of various chemical constituents in and around the AALF. However, numerous wells within the monitoring network do not contribute to the understanding of the distribution of these constituents and are not essential for future monitoring. Therefore, in accordance with a request by the City, Insight Environmental Services Inc., (Insight) has prepared this revised hydrogeologic monitoring plan (HMP) for the AALF.

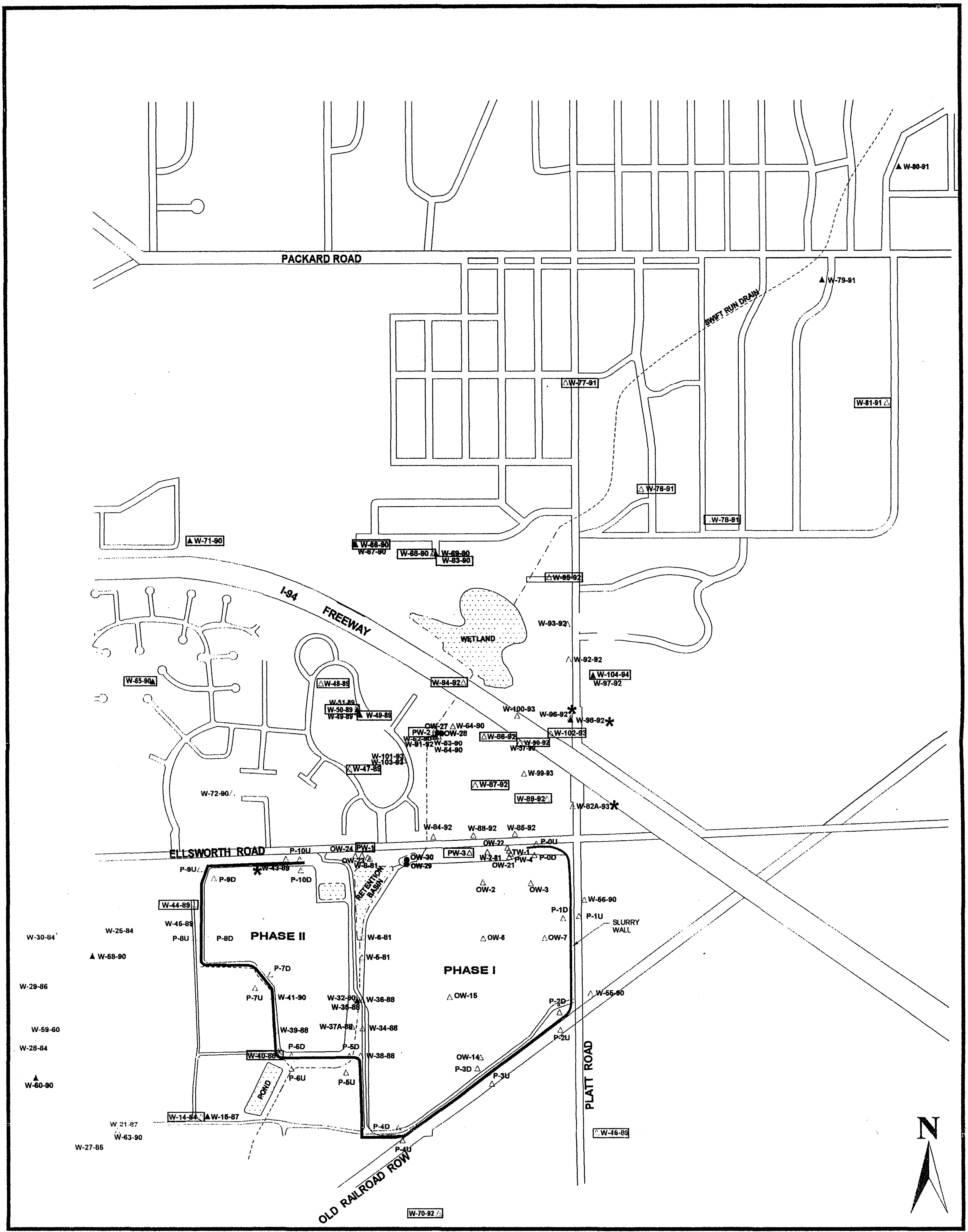
1.1 Background

Review of the last two years of groundwater monitoring data indicates that two separate organic constituent plumes are present at the AALF, these being a vinyl chloride plume and a 1,4-dioxane plume. Isoconcentration maps, previously submitted to the Michigan Department of Environmental Quality (MDEQ) demonstrate that the vinyl chloride plume follows a distinct flow path towards the northeast (from PW-3) and terminates in the vicinity of the Platt Road/I-94 interchange. The 1,4-dioxane plume follows a more north northeast flow path from PW-1 to PW-2. In general, neither plumes configuration or concentrations have significantly changed in the past two years.

The revised monitoring plan, discussed below is based upon an evaluation of data collected since 1996. Monitoring wells specific to the individual contaminant plumes within the upper aquifer have been identified and are to be monitored. Future monitoring of the lower aquifer focuses on key downgradient lower aquifer wells.

1.2 Purpose

The purpose of this HMP is to maintain the City's compliance for post-closure monitoring activities.



LEGEND:

W-1-87 **Monitor Well Location**
OW-2 **Observation Well Location**
TW-1 **Test Well Location**
P-1D **Piezometer Well Location**
PW-1 **Purge Well Location**
△ **Upper Aquifer Well**
▲ **Lower Aquifer Well**
W-70-92 △ **Existing Groundwater Monitoring Sampling Location**
* **Groundwater Monitoring Sampling Location Not Used Due to Problem with Well**

NOTES:

1. Base map provided by The City of Ann Arbor.
2. Additional information drawn by Envirographics of Hamburg, MI (810) 231-3025.

SCALE:
1 Inch = 800 Feet
0' 400' 800' 1600'

MAP OF EXISTING GROUNDWATER MONITORING SAMPLING LOCATIONS

CITY OF ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

Insight
Environmental Services, Inc.
2123 Pless Drive
Brighton, MI 48114-9463
(810) 225-6271

2357-H2A/ExGWSample.cad/2-25-00

FIGURE 1

1.3 Facility Information

Facility Name:	City of Ann Arbor Landfill Platt Road Ann Arbor, Michigan
Facility Contact:	John Newman, Solid Waste Director (734) 994-4235
Type of Facility:	Type II Sanitary Landfill
County:	Washtenaw

2.0 Existing Data Base

Groundwater quality monitoring currently consists of the collection of quarterly samples from select wells surrounding the AALF. Table 1, Current Interim Groundwater Monitoring Program, List of Sample Locations and Analytical Parameters, provides a summary of wells sampled, analytical parameters and the frequency of analysis. Review of Table 1, as well as Figure 1, indicates that 31 groundwater monitoring wells are being sampled on a quarterly basis. Also, static water levels are collected from 41 additional monitoring locations.

An important component of the ongoing remedial measures program at the AALF is an evaluation of the performance of the hydraulic barrier system (slurry wall and purge wells). Performance of the hydraulic barrier system is monitored through the collection of water levels within the AALF and exterior to the AALF. Groundwater elevation contour maps are prepared and submitted to MDEQ on a quarterly basis as part of the quarterly monitoring reports. The plan presented below continues with the collection of groundwater levels and the preparation of a groundwater elevation contour map for the upper aquifer.

Groundwater quality data collected as part of the interim groundwater monitoring program since 1996 are presented as Appendix A, Interim Groundwater Quality Data Base Summary 1996-2000. Isoconcentration maps for chloride, total VOCs and 1,4-dioxane are typically prepared and submitted as part of quarterly monitoring reports. Copies of isoconcentration maps developed as part of the January 2000 sampling survey are attached as Appendix B, Isoconcentration Maps-January 2000. As discussed above, two distinct organic plumes exist north of the AALF. The revised HMP presented below has been specifically developed to monitor these plumes, as well as the hydraulic performance of the ongoing remedial measures program.

Table 1

Current Interim Groundwater Monitoring Program
List of Sample Locations and Analytical Parameters

City of Ann Arbor Landfill

Monitoring Wells	Aquifer Location	SWL	Specific Conductance	pH	TOC	Chloride	1,4-Dioxane	MDNR Scan 1	MDNR Scan 2
W-5-81	U	Q							
W-14-84	U	Q	A	A	A	A	A		
W-37A-88	U	Q							
W-40-88	U	Q	SA	SA	SA	SA	SA		
W-43-89	L	Q	SA	SA	SA	SA	SA	SA	
W-44-89	U	Q	SA	SA	SA	SA			
W-46-89	U	Q	A	A	A	A		A	A
W-47-89	U	Q	SA	SA	SA	SA	SA		
W-48-89	U	Q	Q	Q	Q	Q	Q		
W-49-89	L	Q	SA	SA	SA	SA	SA		
W-50-89	L	Q	Q	Q	Q	Q	Q		
W-55-90	U	Q							
W-64-90	U	Q							
W-65-90	L	Q	SA	SA	SA	SA			
W-66-90	L	Q	SA	SA	SA	SA			
W-68-90	U	Q	SA	SA	SA	SA	SA		
W-70-92	U	Q	A	A	A	A	A	A	A
W-71-90	L	Q	SA	SA	SA	SA			
W-76-91	U	Q	Q	Q	Q	Q	Q		
W-77-91	U	Q	Q	Q	Q	Q	Q		
W-78-91	U	Q	SA	SA	SA	SA			
W-81-91	U	Q	SA	SA	SA	SA			
W-82A-93	U	Q	Q	Q	Q	Q	Q	Q	
W-83-90	L	Q	Q	Q	Q	Q	Q		
W-84-92	U	Q							
W-85-92	U	Q							
W-86-92	U	Q	Q	Q	Q	Q		Q	
W-87-92	U	Q	SA	SA	SA	SA		SA	
W-88-92	U	Q							
W-89-92	U	Q							
W-90-92	U	Q	SA	SA	SA	SA		SA	
W-91-92	U	Q							
W-92-92	U	Q							
W-94-92	U	Q	SA	SA	SA	SA	SA		
W-95-92	U	Q	Q	Q	Q	Q	Q		
W-96-92	U	Q							
W-98-92	L	Q	Q	Q	Q	Q	Q		
W-101-93	U	Q							
W-102-93	U	Q	Q	Q	Q	Q		Q	
W-104-94	L	Q	SA	SA	SA	SA	SA		
OW-2	U	Q							
OW-7	U	Q							
OW-15	U	Q							
OW-23	U	Q							
OW-24	U	Q							
PW-1	U	Q	Q	Q	Q	Q	Q	Q	A
PW-2	U	Q	Q	Q	Q	Q	Q	Q	A
PW-3	U	Q	Q	Q	Q	Q	Q	Q	A
PW-4	U	Q							
TW-1	U	Q							
P-0D	U	Q							
P-0U	U	Q							
P-1D	U	Q							
P-1U	U	Q							
P-2D	U	Q							
P-2U	U	Q							
OW-14 (P-3D)	U	Q							
P-3U	U	Q							
P-4D	U	Q							
P-4U	U	Q							
P-5D	U	Q							
P-5U	U	Q							
P-6D	U	Q							
P-6U	U	Q							
P-7D	U	Q							
P-7U	U	Q							
P-8D	U	Q							
P-8U	U	Q							
P-9D	U	Q							
P-9U	U	Q							
P-1OD	U	Q							
P-10U	U	Q							
					A = 3	A = 3	A = 2	A = 2	A = 5
					SA = 15	SA = 15	SA = 7	SA = 3	
					Q = 13	Q = 13	Q = 11	Q = 6	
72		72	31	31	31	31	20	11	5

Q = Quarterly (Janaury, April, July, October)

SA = Semi annual (April, October): semi annual events previously were conducted in January and July. Schedule revised as of January 1999.

A = Annual (July)

U = Upper aquifer

L = Lower aquifer

Field Parameters include: Specific Conductance; pH; Temperature;

3.0 Groundwater Quality Monitoring Program

Groundwater monitoring at the AALF will be conducted on a quarterly basis during the months of January, April, July and October. Existing groundwater monitoring wells within the upper and lower aquifer will be monitored as described below.

3.1 Groundwater Monitoring

Groundwater monitoring wells specific to the VOC and 1,4-dioxane plumes were selected based upon a review of the orientation of the organic plumes. Groundwater monitoring wells specific to chloride were selected based on a review of the distribution of chloride concentrations. Monitoring well locations were selected to provided a view of the distribution of contaminant concentrations to method detection limits across the length and width of the plumes. Sample collection frequency was determined based upon historical sampling intervals as well as the general variability of the contaminants detected. Sampling frequencies vary from one to four times per year.

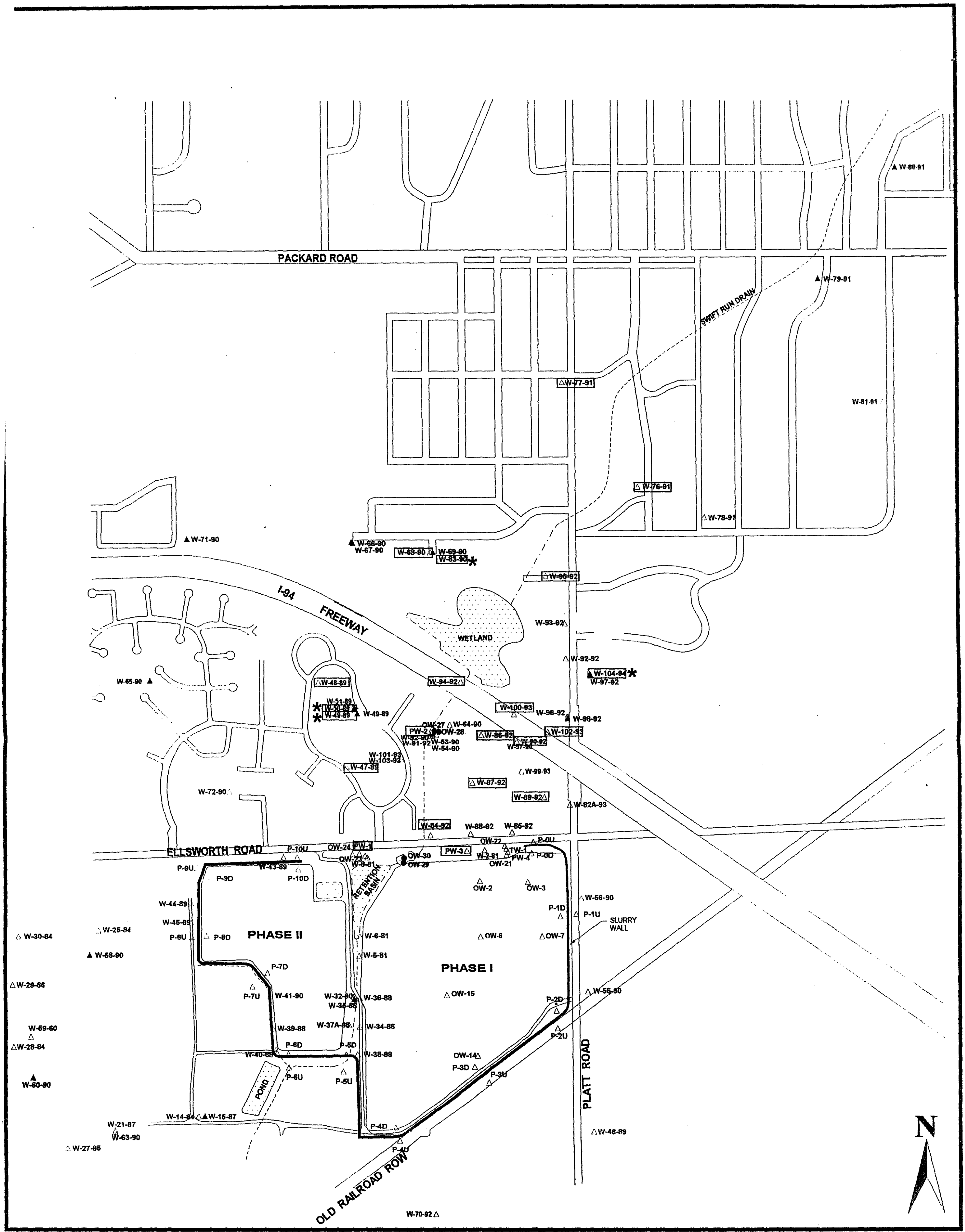
Proposed groundwater monitoring well locations are depicted on Figure 2, Map of Proposed Groundwater Monitoring Sampling Locations. The frequency of sampling and sample parameters are summarized on Table 2, List of Sample Locations and Analytical Parameters. Also identified on Table 2 are groundwater monitoring well locations within which static groundwater water levels are to be obtained. Water levels will be collected within each of the wells shown on Table 2 on a quarterly basis.

Review of Figure 2 and Table 2 indicates that total VOCs are proposed to be collected quarterly from 10 monitoring wells, semi-annually from 15 wells for 1,4-dioxane and semi-annually from 12 wells for chloride. In addition, four wells which are screened within the lower aquifer, are to be sampled annually for 1,4-dioxane. Field parameters consisting of temperature, pH, oxidation reduction potential and specific conductance will be collected prior to sampling.

Water quality samples will be analyzed using the analytical methods presented in Appendix C, Accepted Analytical Methods or similarly approved MDEQ methods. Sampling procedures will conform to those provided in Section 7.0, Field Sampling Procedures.

3.2 Groundwater Flow Mapping

Groundwater elevations are to be collected on a quarterly basis from 63 existing monitoring wells. Wells to be used for determination of the direction of flow in the upper aquifer are presented on Table 2. Quarterly groundwater elevation



LEGEND:

W-1-87	Monitor Well Location
OW-2	Observation Well Location
TW-1	Test Well Location
P-1D	Piezometer Well Location
PW-1	Purge Well Location
△	Upper Aquifer Well
▲	Lower Aquifer Well
W-70-92 △	Proposed Groundwater Monitoring Sampling Location
*	Proposed Annual Sampling Only

NOTES:

1. Base map provided by The City of Ann Arbor.
2. Additional information drawn by Envirographics of Hamburg, MI (810) 231-3025.

SCALE:

1 Inch = 800 Feet

0' 400' 800' 1600'

MAP OF PROPOSED GROUNDWATER MONITORING SAMPLING LOCATIONS

CITY OF ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

Insight
Environmental Services, Inc.
2123 Pless Drive
Brighton, MI 48114-9463
(810) 225-6271

2357-H2A/PGWSample.cad/2-25-00

FIGURE 2

Table 2

List of Sample Locations and Analytical Parameters

City of Ann Arbor Landfill

Monitoring Wells	Aquifer Location	SWL	Field Parameters	VOCs (8260)	Chloride	1,4-Dioxane
W-6-81	U	Q				
W-14-84	U	Q				
W-37A-88	U	Q				
W-44-89	U	Q				
W-46-89	U	Q				
W-47-89	U	Q	SA			SA
W-48-89	U	Q	SA		SA	SA
W-49-89	U/L	Q	SA		A	A
W-50-89	L	Q	SA		A	A
W-51-89	U/L	Q	SA		A	A
W-55-90	U	Q				
W-56-90	U	Q				
W-64-90	U	Q				
W-68-90	U	Q	SA		SA	SA
W-70-92	U	Q				
W-72-90	U	Q				
W-76-91	U	Q	A		SA	SA
W-77-91	U	Q	A		SA	SA
W-78-91	U	Q				
W-81-91	U	Q				
W-83-90	L	Q	A			A
W-84-92	U	Q	Q	Q		
W-85-92	U	Q				
W-86-92	U	Q	Q	Q	SA	SA
W-87-92	U	Q	Q	Q		
W-88-92	U	Q				
W-89-92	U	Q	Q	Q		SA
W-90-92	U	Q	Q	Q	SA	SA
W-91-92	U	Q				
W-92-92	U	Q				
W-93-92	U	Q				
W-94-92	U	Q	SA		SA	SA
W-95-92	U	Q	SA		SA	SA
W-97-92	U	Q				
W-100-93	U	Q	Q	Q		SA
W-101-93	U	Q				
W-102-93	U	Q	Q	Q	SA	SA
W-104-94	L	Q	A			A
PW-1	U	Q	Q	Q	SA	SA
PW-2	U	Q	Q	Q	SA	SA
PW-3	U	Q	Q	Q	SA	SA
PW-4	U	Q				
TW-1	U	Q				
OW-2	U	Q				
OW-7	U	Q				
OW-15	U	Q				
P-0D	U	Q				
P-0U	U	Q				
P-1D	U	Q				
P-1U	U	Q				
P-2D	U	Q				
P-2U	U	Q				
OW-14 (P-3D)	U	Q				
P-3U	U	Q				
P-4D	U	Q				
P-4U	U	Q				
P-5D	U	Q				
P-5U	U	Q				
P-6D	U	Q				
P-6U	U	Q				
P-7D	U	Q				
P-7U	U	Q				
P-8D	U	Q				
P-8U	U	Q				
P-9D	U	Q				
P-9U	U	Q				
P-1OD	U	Q				
P-10U	U	Q				
			A = 4		A = 2	A = 4
			SA = 8		SA = 12	SA = 16
			Q = 10	Q = 10		
		68	22	10	14	20

Q = Quarterly (Janaury, April, July, October)
SA = Semi annual (April, October)
A = Annual (July)
U = Upper aquifer
L = Lower aquifer
Field Parameters include: Specific Conductance; pH; Temperature; ORP

company/current/2357/hmp/table2.wk4 rev 7-12-00 contour maps for the upper aquifer will be submitted with each quarterly sampling survey report.

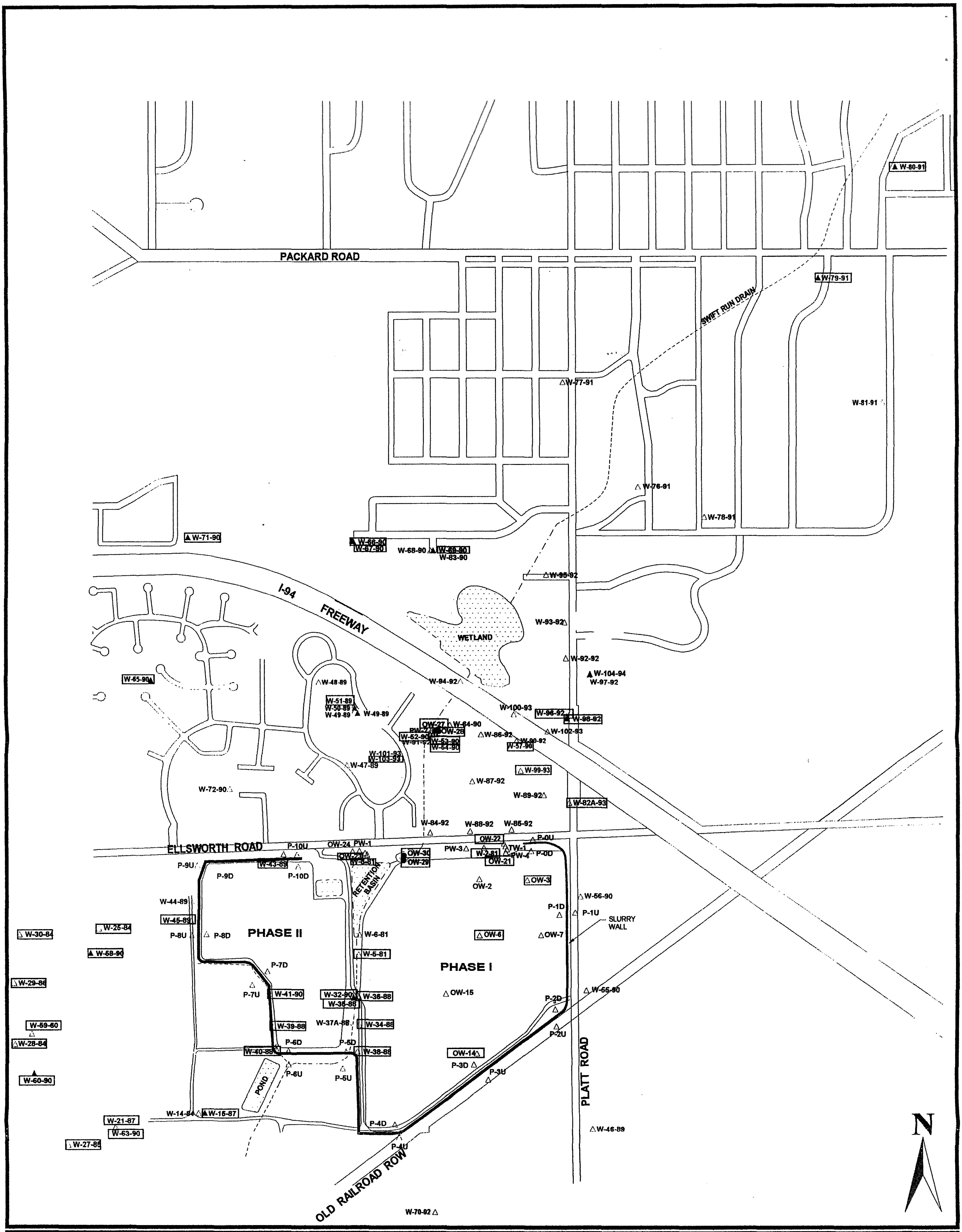
4.0 Well Abandonment

Groundwater and observation wells, which are no longer useful for groundwater quality monitoring, direction of flow determination or monitoring remedial activities exist in or around the AALF, will be properly abandoned. Wells proposed for abandonment are found in three general areas, these being wells in the former Phase 3 area, wells interior to the slurry wall and wells located north of Ellsworth Road. Groundwater monitoring wells proposed to be abandoned are depicted on Figure 3, Map of Proposed Well Abandonments. A list of the wells, by area, proposed for abandonment is provided as Table 3, List of Proposed Well Abandonment Locations. Also shown on Table 3 are proposed abandonment techniques. Review of Table 3 indicates that 12 wells are associated with the Phase 3 area, 19 wells are interior to the slurry wall and 20 wells are located north of Ellsworth Road.

Abandonment techniques vary depending on the wells physical location and the lithology present at each location. Abandonment techniques include: 1) overdrilling and grouting, 2) straight pulling and grouting, and 3) removal of the near surface casing and grouting. It should be noted that some wells proposed for abandonment may have been destroyed due to construction, traffic accidents or for other unknown reasons. Attempts to locate wells, which are not easily observed, will include surveying and if possible, detection with a metal detector. Each of the selected well abandonment techniques are described below.

1) Overdrilling and grouting - This abandonment technique will be primarily used for wells which were installed through a confining layer. Typically these wells were installed within the lower aquifer. As part of abandonment preparations, the protective well casings will be removed. Following protective casing removal, the well will then be overdrilled to a depth equal to the bottom of the well screen with 4.25-inch hollow-stem augers. The well casing and screen will then be removed. Following casing and screen removal, the augers will be backfilled with cement bentonite grout from the bottom of the borehole to the top of the augers using a tremmie pipe. The augers will then be retracted from the borehole at 5-foot increments. Grout will be added to the augers as needed to maintain an appropriate head of grout within the augers during auger retraction.

2) Straight pulling and grouting - This abandonment technique will be primarily used for wells which are relatively shallow and installed within the upper aquifer. As part of abandonment preparations, the protective well casings will be



LEGEND:

W-1-87	Monitor Well Location
OW-2	Observation Well Location
TW-1	Test Well Location
P-1D	Piezometer Well Location
PW-1	Purge Well Location
△	Upper Aquifer Well
▲	Lower Aquifer Well
W-14-84	Proposed Well to be Abandoned

NOTES:

1. Base map provided by The City of Ann Arbor.
2. Additional information drawn by Envirographics of Hamburg, MI (810) 231-3025.

SCALE:
1 Inch = 800 Feet
0' 400' 800' 1600'

MAP OF PROPOSED
WELL ABANDONMENTS

CITY OF ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

Insight
Environmental Services, Inc.
2123 Pless Drive
Brighton, MI 48114-9463
(810) 225-6271

2357-H2A/WellAband.cad/2-25-00

FIGURE 3

Table 3

List of Proposed Well Abandonment Locations

City of Ann Arbor Landfill

Monitoring Well Number	Area	Abandonment Technique
W-15-87	1	Overdrill and Grout
W-21-87	1	Straight Pull and Grout
W-25-84	1	Straight Pull and Grout
W-27-85	1	Straight Pull and Grout
W-28-84	1	Straight Pull and Grout
W-29-86	1	Straight Pull and Grout
W-30-84	1	Straight Pull and Grout
W-45-89	1	Straight Pull and Grout
W-58-90	1	Overdrill and Grout
W-59-90	1	Straight Pull and Grout
W-60-90	1	Overdrill and Grout
W-63-90	1	Straight Pull and Grout
OW-14	2	Cut and Grout
OW-21	2	Cut and Grout
OW-22	2	Cut and Grout
OW-23	2	Cut and Grout
OW-29	2	Cut and Grout
OW-3	2	Cut and Grout
OW-30	2	Cut and Grout
OW-6	2	Cut and Grout
W-2-81	2	Overdrill and Grout
W-32-90	2	Overdrill and Grout
W-34-88	2	Overdrill and Grout
W-35-88	2	Overdrill and Grout
W-36-88	2	Overdrill and Grout
W-38-88	2	Overdrill and Grout
W-39-88	2	Overdrill and Grout
W-41-90	2	Overdrill and Grout
W-43-89	2	Overdrill and Grout
W-5-81	2	Overdrill and Grout
W-8-81	2	Overdrill and Grout
OW-27	3	Straight Pull and Grout
OW-28	3	Straight Pull and Grout
W-40-88	2	Overdrill and Grout
W-51-89	3	Straight Pull and Grout
W-52-90	3	Straight Pull and Grout
W-53-90	3	Straight Pull and Grout
W-54-90	3	Straight Pull and Grout
W-57-90	3	Straight Pull and Grout
W-65-90	3	Overdrill and Grout
W-66-90	3	Overdrill and Grout
W-67-90	3	Overdrill and Grout
W-69-90	3	Overdrill and Grout
W-71-90	3	Overdrill and Grout
W-73-90	3	Overdrill and Grout
W-74-90	3	Overdrill and Grout
W-79-91	3	Overdrill and Grout
W-80-91	3	Overdrill and Grout
W-82A-93	3	Straight Pull and Grout
W-99-93	3	Straight Pull and Grout
W-96-92	3	Overdrill and Grout
W-98-92	3	Straight Pull and Grout
W-103-93	3	Straight Pull and Grout

Area 1 = Former Phase 3 Expansion Area
Area 2 = Area within or Adjacent to Slurry Wall
Area 3 = Area North of Ellsworth Road

removed. Following the protective casing removal, the well casing and screen will then be pulled from the ground using the drill rig cable system. Following casing and screen removal, grout will be placed into the remaining void space to the ground surface. If the casing can not be pulled from the ground, then the technique described above will be used.

3) Removal of surface casing and grouting - This abandonment technique will be used for wells which are located within the confines of the slurry wall and not in the lower aquifer. Due to potential methane hazard, overdrilling or pulling of these wells is not recommended. As part of abandonment preparations, the protective well casings and up to 3-feet of casing below the ground surface will be removed. Following the protective casing and well casing removal, grout will be placed into the well to the ground surface.

Drilling equipment will be cleaned between each well with a high pressure steam cleaner. Well casings and screens will be disposed of at the AALF recycling center. Abandonment logs for each well will be prepared and included in an abandonment report.

5.0 Amending the Groundwater Monitoring Program

Depending upon the results of future groundwater monitoring data, it may be necessary to modify the HMP. The City may desire to alter the frequency or location of sampling events in the future. A request will be made to MDEQ prior to modifying sample analysis parameters, sample locations or any adjustments to sampling frequency.

6.0 Field Sampling Procedures

Water quality sampling of the AALF monitoring system will be performed in accordance with the provisions of the publication entitled "Test Methods for Evaluating Solid Waste, Physical-Chemical Methods", EPA publication SW-846, which is incorporated into this document by reference. When applicable, the order for sample collection will be as follows: 1) Volatile Organic Parameters; 2) Inorganic Parameters.

6.1 Groundwater Sampling

1. Determination of Static Water Level: Static water level measurements will be recorded using an electronic water level meter accurate to 0.01-feet, from each well prior to purging, during sampling events. All water level

measurements will be recorded within a 24-hour time period to avoid any temporal variations which may occur in groundwater flow. Measurements will be made from the top of the casing, with the elevation of all casings in the monitoring well systems related to a permanent survey mark, using United States Geological Survey datum. During each annual sampling event, after determining the static water level, sampling personnel will determine the total depth of the monitoring well to evaluate if excessive siltation has occurred within the well.

2. Well Evacuation: All groundwater samples that are obtained shall be representative of the site's groundwater quality. To ensure that all samples obtained are representative of the groundwater, all wells to be sampled will be purged of a minimum of three well volumes. Field measurements of pH, specific conductance, oxidation reduction potential and temperature will be recorded from water samples extracted from the well to determine if stable chemical conditions have been achieved (i.e., two consecutive measurements of +/- 10-percent). After stable chemical conditions have been achieved, samples will then be collected as required.

Monitoring wells will be purged at a flow rate that is at or below the wells' recovery rate. Sampling personnel will attempt to avoid purging wells to dryness and/or agitating groundwater. For wells which bail or pump dry during purging, recovery rates will be determined and samples taken within 24-hours of purging.

Sampling will be performed from upgradient to downgradient monitoring locations using appropriate methods. If the monitoring wells are located in areas of known groundwater contamination, then sampling will be in the order from the least contaminated well to the most contaminated well. Sampling apparatus will be cleaned with a mild detergent and thoroughly rinsed with deionized water prior to each use. If bailers are used, an appropriate length of new nylon rope will be secured to the bailer at each location.

Water evacuated from each monitor well will be discharged to the ground, far enough away from the well to avoid recycling of the flow, or storm sewer, if available.

3. Sample Collection: Groundwater samples will be collected using either a submersible pump or bailer. Samples will be collected by personnel who have thoroughly reviewed this HMP and are familiar with the sampling procedures. Samples will be collected with only inert nonreactive sampling equipment, with care taken to avoid cross-contamination. Any well that does not have a dedicated sampling system will be sampled with a clean sampling apparatus that has been washed with a mild detergent and rinsed thoroughly with deionized

water after each sample collection. Samples will be transferred directly from the sampling system to the appropriate container. When using a non-dedicated sampling system, wells will be sampled from upgradient to downgradient. If wells are contaminated, they will be sampled in order from the least contaminated well to the most contaminated well.

4. Sample Preservation: Groundwater samples will be collected in the designated size and type of containers required for specific parameters, as specified in Appendix D, Sample Preservation and Container Size. Sample containers will be filled in such a manner as not to lose any preservative chemicals from the containers.

5. Field Measurements: Groundwater samples will be stored at a temperature of approximately 4° Celsius for transportation to a laboratory for analysis. Parameters that will be measured in the field include: temperature, pH, oxidation reduction potential and specific conductance.

6. Sample Shipment: Groundwater samples will be preserved as previously described, stored in appropriate containers, and labeled. Samples will be cooled to 4° Celsius and transported to the laboratory for analysis.

7. Well Maintenance: Monitoring wells will be visible throughout the year, clearly labeled, securely capped, properly vented and covered with locking protective casings. The City will notify MDEQ before replacing any monitoring well.

8. Chain of Custody: Chain of custody procedures will be used to allow for the tracking of possession and handling of samples from the time of collection to the completion of laboratory analysis. A chain of custody form will accompany each set of samples to the analytical laboratory. A copy of this form is attached as Appendix E, Field Sampling Form.

9. Detection Limits: Laboratory analysis of all indicator parameters listed as part of this HMP will meet the detection limits presented in Appendix C.

10. Quality Assurance / Quality Control

Field QA/QC - Each time a group of bottles for volatile analysis is prepared for use in the field, one type of each bottle will be filled with deionized water by the laboratory and labeled "Trip Blank". These bottles will be transported along with the sample bottles to the sampling locations and handled identically to the well samples, then returned to the laboratory for complete analysis.

Laboratory QA/QC - Along with samples submitted for laboratory analysis, a field blank of deionized water will be collected and labeled "Field Blank". In addition, sample spikes will be performed by the analytical laboratory for chloride and organic constituents. One sample per analytical set of 10 will be spiked and analyzed and recoveries reported. As part of the operation of the analytical laboratories, standards will be analyzed on a continual basis. Data from these analyses are used by the laboratory to monitor and document performance. Presently, analyses are completed by Brighton Analytical, L.L.C. of Brighton, Michigan and Ann Arbor Technical Service's of Ann Arbor, Michigan. Copies of Brighton Analytical's and Ann Arbor Technical Services Quality Assurance Plans are attached as Appendix F, Quality Assurance Plans.

7.0 Reporting

Each set of monitoring data will be submitted to the MDEQ within 30-days after the end of the calendar quarter during which the sampling event was performed. Reporting deadlines for each of the sampling quarters are as follows:

Sample Collection Event:	Reporting Deadline:
First Quarter - January	April 30
Second Quarter - April	July 30
Third Quarter - July	October 30
Fourth Quarter - October	January 30

The reports will include a brief description of the methodologies used during groundwater sample collection, isoconcentration maps, a discussion of the isoconcentration maps, analytical results, chain of custody, water level measurements, copies of field sampling records and a groundwater elevation contour map for the upper aquifer.

Respectfully submitted,

Mark B. Sweatman

Mark B. Sweatman
Certified Professional Geologist, No. 8698

APPENDIX A
Interim Groundwater Quality Data Base Summary 1996-2000

City of ____or Land
Ann Arbor, Michigan
Data Base Summary
PURGE WELL 1a (PW-1a)

Analyte	Units	Detection	July	October	January	April	June	October	January	April	July	October	January	April	July	October	January
		Level	10	14	8	15	9	21	15 &16	8	7	12 & 22+	8	15	14	14	19
			1996*	1996*	1997*	1997*	1997**	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000
Specific Conductance	umho/cm	0.001	1024	1,056	786	795	NT	661	1,110	1,026	711	1,045	1,000	669	740	1,097	1,238
pH	S.U.	0.1	7.24	6.24	6.5	6.82	7	6.37	6.6	6.81	6.81	7.03	7.12	7.63	6.85	7.19	6.92
Temperature	degree F	0.1	NT	NT	NT	NT	NT	NT	48.9	53.5	58.3	57.9	50.4	54.2	57.4	53.6	54.5
Chemical Oxygen Demand (COD)	mg/l	10	5.9	NT	NT	NT	11	NT	NT	NT	14.0	NT	NT	NT	16	NT	NT
Total Organic Carbon (TOC)	mg/l	0.5	3.6	3.1	3.2	2.7	NT	2.7	3.1	3.8	2.9	2.5	1.6	1.6	2.5	1.2	1.3
Chlorides	mg/l	1	104	78	64	74	NT	93	92	88	71	58	56	56	55	49	73
Nitrogen, ammonia	mg/l	0.01	0.78	NT	NT	NT	NT	NT	NT	NT	0.79	NT	NT	NT	0.48	NT	NT
Nitrogen, nitrate	mg/l	0.05	<0.5	NT	NT	NT	NT	NT	NT	NT	<0.05	NT	NT	NT	<0.05	NT	NT
Bicarbonate Alkality	mg/l	5	589	NT	NT	NT	NT	NT	NT	NT	620	NT	NT	NT	550	NT	NT
Sulfate	mg/l	2	54	NT	NT	NT	NT	NT	NT	NT	41	NT	NT	NT	33	NT	NT
1,4-Dioxane	mg/L	0.001	0.24	0.13	0.13	0.1	0.19	0.26	0.19	0.21	0.24	0.13	0.2	0.16	0.15	0.3	0.18
Benzene	ug/l	1	<1	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	NT	<5	NT	<5
Bromodichloromethane	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane/Methyl Bromide	ug/l	5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/l	5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorodibromomethane	ug/l	1	NT	NT	NT	NT	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l	1	<1	<1	<1	<1	NT	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l	1	<1	<1	<1	<1	NT	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	1	<1	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	NT	<1	NT	<1
Methylene Chloride	ug/l	5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	ug/l	1	<1	<1	<1	<1	<10	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	1	<1	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	NT	<1	NT	<1
1,1,1-Trichloroethane	ug/l	10	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l	5	<5	<5	<5	<5	NT	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride	ug/l	5	<5	<5	16	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Xylenes (Total)	ug/l	1	<1	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	NT	<3	NT	<3
Dissolved Arsenic	mg/L	0.001	0.0014	NT	NT	NT	<0.001	NT	NT	NT	0.002	NT	NT	NT	0.001	NT	NT
Dissolved Calcium	mg/L	0.1	165	NT	NT	NT	120	NT	NT	NT	160	NT	NT	NT	170	NT	NT
Dissolved Iron	mg/L	0.1	7.41	NT	NT	NT	0.58	NT	NT	NT	0.71	NT	NT	NT	8.9	NT	NT
Dissolved Magnesium	mg/L	0.1	55	NT	NT	NT	41	NT	NT	NT	53	NT	NT	NT	55	NT	NT
Dissolved Sodium	mg/L	1	56	NT	NT	NT	23	NT	NT	NT	43	NT	NT	NT	37	NT	NT
Dissolved Zinc	mg/L	0.004	0.013	NT	NT	NT	0.02	NT	NT	NT	0.014	NT	NT	NT	<0.004	NT	NT

NT = Indicator parameter not tested.

Data prior to 1996 not shown on this data base summary table. +Groundwater samples collect for VOC analysis on 10/22/98/ uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units.

NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested. Shading = Indicator parameter exceeds tolerance limit for monitoring point.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
PURGE WELL 2 (PW-2)

Analyte	Units	Detection	July	October	January	April	June	October	January	April	July	October	January	April	July	October	January
		Level	9	14	7	15	9	21	15	8	7	12 & 22+	8	15	14	14	19
			1996*	1996*	1997*	1997*	1997**	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000
Specific Conductance	umho/cm		1146	1,235	947	1,623	NT	882	1,645	1,294	1,021	1,512	1,400	1,524	1,200	1,784	1,820
pH	S.U.	0.1	7.31	6.91	6.56	6.9	6.6	6.46	6.87	6.88	6.45	6.64	6.63	7.56	7.09	7.05	6.95
Temperature	degree F.	0.1						49.9	53.9	50.5	59.5	63	52.8	53.3	57.7	57.7	53.4
Dissolved Oxygen	mg/L	0.05															2.05
Oxygen Saturation	%	0															34.1
Chemical Oxygen Demand (COD)	mg/L	10	231	NT	NT	NT	11	NT	NT	NT	15.0	NT	NT	NT	<3.0	NT	NT
Total Organic Carbon (TOC)	mg/L	0.5	4	4	3.7	3.6	NT	3.8	3.8	4.4	3.2	3.4	2.7	2.8	4.7	2.2	2.6
Chlorides	mg/L	1	231	218	235	242	NT	310	250	280	270	250	250	260	260	270	260
Nitrogen, ammonia	mg/L	0.01	1.6	NT	NT	NT	NT	NT	NT	NT	1.2	NT	NT	NT	1.9	NT	NT
Nitrogen, nitrate	mg/L	0.05	<0.5	NT	NT	NT	NT	NT	NT	NT	<0.05	NT	NT	NT	<0.05	NT	NT
Bicarbonate Alkaliity	mg/L	5	508	NT	NT	NT	NT	NT	NT	NT	560	NT	NT	NT	480	NT	NT
Sulfate	mg/L	2	108	NT	NT	NT	NT	NT	NT	NT	72	NT	NT	NT	81	NT	NT
1,4-Dioxane	mg/L	0.001	0.28	0.22	0.38	0.11	0.24	0.25	0.23	0.21	0.26	0.23	0.23	0.24	0.19	0.55	0.23
Benzene	ug/L	1	<1	NT	NT	NT	<10	NT	NT	NT	<5	NT	NT	NT	<5	NT	<5
Bromodichloromethane	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane/Methyl Bromide	ug/L	5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/L	5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorodibromomethane	ug/L	1	NT	NT	NT	NT	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/L	1	<1	<1	<1	<1	NT	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/L	1	<1	<1	<1	<1	NT	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/L	1	<1	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	NT	<1	NT	<1
Methylene Chloride	ug/L	5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/L	1	<1	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	NT	<1	NT	<1
1,1,1-Trichloroethane	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/L	1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/L	5	<5	<5	<5	<5	NT	<5	<1	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride	ug/L	5	<5	<5	9.8	<5	<10	<5	<5	9	<5	<5	<5	<5	<5	<5	<5
Xylenes (Total)	ug/L	1	<1	NT	NT	NT	<10	NT	<1	NT	NT	NT	NT	NT	<3	NT	<3
									<1								
Dissolved Arsenic	mg/L	1	<0.001	NT	NT	NT	0.001	NT	NT	NT	<0.001	NT	NT	NT	<0.001	NT	NT
Dissolved Calcium	mg/L	0.5	162	NT	NT	NT	160	NT	<5	NT	170	NT	NT	NT	160	NT	NT
Dissolved Iron	mg/L	20	6.13	NT	NT	NT	1.4	NT	<1	NT	0.62	NT	NT	NT	5.5	NT	NT
Dissolved Magnesium	mg/L	1	50	NT	NT	NT	60	NT	<1	NT	54	NT	NT	NT	51	NT	NT
Dissolved Sodium	mg/L	1	96	NT	NT	NT	100	NT	NT	NT	120	NT	NT	NT	130	NT	NT
Dissolved Zinc	mg/L	0.004	0.21	NT	NT	NT	0.17	NT	NT	NT	0.096	NT	NT	NT	0.5	NT	NT

NT = Indicator parameter not tested. +Groundwater samples collected for VOC analysis on 10-22-98. Data prior to 1996 is not shown on this data base summary table. Shading = Indicator parameter exceeds tolerance limit for monitoring point.

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested. < = less than current detection limit.

C______ Arbor
Ann Arbor, Michigan
Data Base Summary
PURGE WELL 3 (PW-3)

Analyte	Units	Detection	July	October	January	April	June	October	January	April	July	October	December	April	July	October	January
		Level	10	14	8	15	9	21	15	8	7	12 & 22+	28	15	14	14	19
			1996*	1996*	1997*	1997*	1997**	1997	1998	1998	1998	1998	1998	1999	1999	1999	2000
Specific Conductance			1349	1,188	958	1,603	NT	907	1,650	1,279	930	1,427	NT	1,360	720	1,783	1,901
pH	S.U.	0.1	6.57	6.39	6.19	7.18	6.4	6.12	6.2	6.74	6.61	6.61	6.77	7.45	6.97	6.82	6.78
Temperature	degree F	0.1	NT	NT	NT	NT	NT	NT	52.3	52.2	58.1	59.8	NT	52.9	56.3	56.1	47.8
Dissolved Oxygen	mg/L	0.05															6.91
Oxygen Saturation	%	0															67.4
Chemical Oxygen Demand (COD)	mg/L	10	18	NT	NT	NT	<10	NT	NT	NT	13.0	NT	23	NT	10	NT	NT
Total Organic Carbon (TOC)	mg/L	0.5	8.9	8	6.2	3.3	NT	4.3	4.8	4.6	2.1	3.4	NT	2.9	4.9	3.4	4
Chlorides	mg/L	1	14	175	194	184	NT	220	450	230	210	210	NT	180	210	240	220
Nitrogen, ammonia	mg/L	0.05	14	NT	NT	NT	3.9	NT	NT	NT	4.2	NT	7.3	NT	4.1	NT	NT
Nitrogen, nitrate	mg/L	0.01	<0.05	NT	NT	NT	NT	NT	NT	NT	<0.05	NT	NT	NT	<0.05	NT	NT
Bicarbonate Alkality	mg/L	5	698	NT	NT	NT	NT	NT	NT	NT	450	NT	NT	NT	480	NT	NT
Sulfate	mg/L	2	22	NT	NT	NT	NT	NT	NT	NT	89	NT	NT	NT	79	NT	NT
1,4-Dioxane	mg/L	0.001	0.31	0.18	0.19	0.029	0.040	0.078	0.098	0.037	0.054	0.069	0.088	0.078	0.052	0.091	0.12
Benzene	ug/L	1	1.2	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	NT	<5	NT	<5
Bromodichloromethane	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Bromoform	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Bromomethane/Methyl Bromide	ug/L	5	<5	<5	<25	<5	<10	<5	<5	<5	<5	<5	NT	<5	<5	<5	<5
Carbon tetrachloride	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Chlorobenzene	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Chloroethane	ug/L	5	8.4	9.2	<25	8.5	<10	8	10	<5	<5	<5	NT	6	<5	<5	<5
Chloroform	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Chlorodibromomethane	ug/L	1	NT	NT	NT	NT	10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
1,1-Dichloroethane	ug/L	1	<1	1.9	<5	2.3	<10	<1	2	2	1	1	NT	1	1	2	2
1,2-Dichloroethane	ug/L	1	<1	<1	<5	2.3	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
1,1-Dichloroethene	ug/L	1	<1	<1	<5	<1	NT	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/L	1	2.3	5.1	11	7.7	NT	3	6	5	5	7	NT	6	6	10	14
trans-1,2-Dichloroethene	ug/L	1	<1	<1	<5	<1	NT	<1	<1	<1	<1	<1	NT	<1	<1	1	2
1,2-Dichloropropane	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/L	1	<1	<1	<5	<1	NT	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Ethylbenzene	ug/L	1	<1	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	<1	<1	NT	NT
Methylene Chloride	ug/L	5	<5	<5	<25	<5	<10	<5	<5	<5	<5	<5	<1	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Tetrachloroethene	ug/L	1	<1	<1	<5	<1	<10	<1	<1	1	<1	<1	NT	<1	<1	<1	<1
Toluene	ug/L	1	<1	NT	NT	NT	<10	NT	NT	NT	NT	NT	NT	<1	<1	NT	NT
1,1,1-Trichloroethane	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Trichloroethene	ug/L	1	<1	<1	<5	<1	<10	<1	<1	<1	<1	<1	NT	<1	<1	<1	<1
Trichlorofluoromethane	ug/L	5	<5	<5	<25	<5	NT	<5	<5	<5	<5	<5	NT	<5	<5	<5	<5
Vinyl chloride	ug/L	5	54	98	200	100	65	54	72	47	97	130	100	150	62	120	130
Xylenes (Total)	ug/L	1	<1	NT	NT	NT	<10	NT	NT	NT	<3	NT	NT	NT	<3	NT	<3
Dissolved Arsenic	mg/L	0.001	0.027	NT	NT	NT	0.001	NT	NT	NT	0.009	NT	NT	NT	0.012	NT	NT
Dissolved Calcium	mg/L	0.1	167	NT	NT	NT	170	NT	NT	NT	160	NT	NT	NT	160	NT	NT
Dissolved Iron	ug/L	0.1	23	NT	NT	NT	7	NT	NT	NT	5	NT	NT	NT	9	NT	NT
Dissolved Magnesium	mg/L	0.1	54	NT	NT	NT	43	NT	NT	NT	33	NT	NT	NT	41	NT	NT
Dissolved Sodium	mg/L	1	99	NT	NT	NT	120	NT	NT	NT	110	NT	NT	NT	100	NT	NT
Dissolved Zinc	mg/L	0.004	0.17	NT	NT	NT	0.19	NT	NT	NT	0.19	NT	NT	NT	0.29	NT	NT

NT = Indicator parameter not tested. + Groundwater samples collected for VOC analysis on 10/22/98. Groundwater sample collected on 12/12/98 was obtained by the City of Ann Arbor. Data prior to 1996 not shown on this data base table.

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-102-93

Analyte	Units	Detection	Tolerance	April	July	January	April	January	April	July	January	April
		Level	Limit	10	9	8	15	16	8	7	9	15
				1996	1996	1997	1997	1998	1998	1998	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	1,171	733	660	1,375	902	1,025	1,023	1,100	1,322
pH	standard	1 su	6.40-7.96	6.76	7.79	7.04	7.97	7.26	7.22	7.14	7.11	7.62
Temperature	degree F.	0.1	NC	NT	NT	NT	NT	41	52.8	57.1	51.3	51.7
Total Organic Carbon (TOC)	mg/L	0.5	6.72	1.3	1.4	1.5	1.5	3.6	2.6	3.3	0.8	<0.50
Chloride	mg/L	1	40	255	120	99	145	170	130	140	200	190
Bromodichloromethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane/Methyl bromide	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorodibromomethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene chloride	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not calculated for this parameter.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-104-94

Analyte	**Units**	**Detection**	**Tolerance**	**July**	**January**	**July**	**January**	**July**	**April**	**July**	**October**
		Level	**Limit**	**9**	**7**	**29**	**16**	**7**	**15**	**15**	**14**
				1996	**1997**	**1997**	**1998**	**1998**	**1999**	**1999**	**1999**
Specific Conductance	umho/cm	0.001 us/cm	962	1,188	1,189	1,225	1,490	1,199	1,453	1,330	1,500
pH	standard	1 su	6.40-7.96	7.3	7.21	7.11	6.91	7.12	7.40	7.69	7.08
Temperature	degree F.	0.1	NC	NT	NT	55.9	42.4	54.2	51.3	58.9	50.4
Total Organic Carbon (TOC)	mg/L	0.5	6.72	1.9	2.1	6.6*	2.2	1.4	2.9	2.2	4.9
Chloride	mg/L	1	40	349	327	390	390	380	330	330	300
1,4-Dioxane	mg/L	0.001	NC	0.0099	0.0039	<0.001*	<0.001	<0.001	<0.001	<0.001	

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

*Groundwater sample collected on August 7, 1997

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary

MONITORING WELL W-14-84

Analyte	Units	Detection	Tolerance	July	July	July	July
		Level	Limit	9	25	7	15
				1996	1997	1998	1999
Specific Conductance	umho/cm	0.001 us/cm	962	903	715	732	815
pH	standard	1 su	6.40-7.96	7.51	7.1	7.31	7.83
Temperature	degree F.	0.1	NC	NT	54.6	59.1	61.7
Total Organic Carbon (TOC)	mg/L	0.5	6.72	11	48	6	5.2
Chloride	mg/L	1	40	37	130	19	20
1,4-Dioxane	mg/L	0.001	NC	<0.001	<0.001	<0.001	<0.001

NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested. uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-40-88

Analyte	Units	Detection	Tolerance	January	July	January	July	April	July	October
		Level	Limit	8	28	15	7	15	15	14
				1997	1997	1998	1998	1999	1999	1999
Specific Conductance	umho/cm	0.001 uS/cm	962	654	680	802	613	774	929	891
pH	s.u.	1 su	6.40-7.96	6.96	7.24	6.8	7.17	8.1	7.93	7.63
Temperature	degree F.	0.1	NC	NT	59.6	50.3	56.7	54.1	55.2	53.2
Total Organic Carbon (TOC)	mg/L	0.5	6.72	2	1.9	2.5	5.8	1.6	2.4	7.5
Chloride	mg/L	1	40	43	44	46	51	54	54	52
1,4-Dioxane	mg/L	0.001	NC	0.01	0.013	0.013	0.017	0.018	0.012	0.015
Bromodichloromethane	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
Bromoform	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
Bromomethane/Methyl bromide	ug/L	5	NC	NT	<5	<5	<5	NT	NT	<5
Carbon tetrachloride	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
Chlorobenzene	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
Chloroethane	ug/L	5	NC	NT	<5	<5	<5	NT	NT	<5
Chloroform	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
Chlorodibromomethane	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
1,1-Dichloroethane	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
1,2-Dichloroethane	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
1,1-Dichloroethene	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
cis-1,2-Dichloroethene	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
trans-1,2-Dichloroethene	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
1,2-Dichloropropane	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
cis-1,3-Dichloropropene	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
trans-1,3-Dichloropropene	ug/L	1	NC	NT	<1	<1	<1	NT	NT	<1
Methylene chloride	ug/L	5	NC	<5	<5	<5	<5	NT	NT	<5
1,1,2,2-Tetrachloroethane	ug/L	1	NC	<1	<1	<1	<1	NT	NT	<1
Tetrachloroethene	ug/L	1	NC	<1	<1	<1	<1	NT	NT	<1
1,1,1-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	NT	NT	<1
1,1,2-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	NT	NT	<1
Trichloroethene	ug/L	1	NC	<1	<1	<1	<1	NT	NT	<1
Trichlorofluoromethane	ug/L	5	NC	<5	<5	<5	<5	NT	NT	<5
Vinyl chloride	ug/L	5	NC	<5	<5	<5	<5	NT	NT	<5

uS/cm = microsiemens per centimeter
mg/L = milligrams per liter
ug/L = micrograms per liter
s.u. = standard units
NC = Tolerance limit not calculated for this parameter
NT = Indicator parameter not tested
Shading = Indicator parameter exceeds tolerance limit for monitoring point.
Data prior to 1997 not shown on this data base table.
< = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-44-89

Analyte	Units	Detection	Tolerance	July	January	July	January	July	April	October
		Level	Limit	10	8	25	15	7	15	14
				1996	1997	1997	1998	1998	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	317	425	335	455	1117	439	511
pH	standard	1 su	6.40-7.96	7.08	7.48	7.70	7.48	7.22	8.00	7.49
Temperature	degree F.	0.1	NC	NT	NT	56.1	48.2	60.3	52.9	51.6
Total Organic Carbon (TOC)	mg/L	0.5	6.72	1.1	0.8	0.9	1.2	2.9	2.3	2.4
Chloride	mg/L	1	40	8.1	6.6	7.6	5.9	6.0	8.8	5.0

NC = Tolerance limit not calculated for this parameter

NT = Indicator parameter not tested

uS/cm = microsiemens per centimeter

mg/L = milligrams per liter

ug/L = micrograms per liter

s.u. = standard units

Shading = Indicator parameter exceeds tolerance limit for monitoring point

Data prior to 1996 not shown on this data base table

< = less than current detection limit

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-46-89

Analyte	Units	Detection	Tolerance	July	July	July	July
		Level	Limit	9	28	7	15
				1996	1997	1998	1999
Specific Conductance	umho/cm	0.001 us/cm	962	560	457	473	756
pH	standard	1 su	6.40-7.96	7.46	7.53	7.21	7.45
Temperature	degree F.	0.1	NC	NT	56.1	54.6	51.1
Dissolved Oxygen	mg/L	0.05	NC	5.6	0.97	1.6	2.92
Oxygen Saturation	%	1	NC	NT	7	21	27.6
Chloride	mg/L	1	40	11	12	10	13
Nitrogen, ammonia	mg/L	0.01	NC	<0.5	<0.01	0.02	0.1
Nitrogen, nitrate	mg/L	0.05	NC	0.34	0.3	0.83	0.96
Nitrogen, nitrite	mg/L	5	NC	335	340	350	350
Chemical Oxygen Demand	mg/L	3	NC	<5	<3	10	<3
Sulfates	mg/L	2	NC	66	69	64	58
1,4-Dioxane	mg/L	0.001	NC				
Benzene	ug/L	5	NC	<1	<5	NT	<5
Bromodichloromethane	ug/L	1	NC	NT	<1	NT	<1
Bromoform	ug/L	1	NC	NT	<1	NT	<1
Bromomethane/Methyl bromi	ug/L	5	NC	NT	<5	NT	<5
Carbon tetrachloride	ug/L	1	NC	NT	<1	NT	<1
Chlorobenzene	ug/L	1	NC	NT	<1	NT	<1
Chloroethane	ug/L	5	NC	NT	<5	NT	<5
Chloroform	ug/L	1	NC	NT	<1	NT	<1
Chlorodibromomethane	ug/L	1	NC	NT	<1	NT	<1
Dichloroethane	ug/L	1	NC	NT	<1	NT	<1
Dichloroethane	ug/L	1	NC	NT	<1	NT	<1
Dichloroethene	ug/L	1	NC	NT	<1	NT	<1
Dichloroethene	ug/L	1	NC	NT	<1	NT	<1
Dichloroethene	ug/L	1	NC	NT	<1	NT	<1
Dichloropropane	ug/L	1	NC	NT	<1	NT	<1
Dichloropropene	ug/L	1	NC	NT	<1	NT	<1
Dichloropropene	ug/L	1	NC	NT	<1	NT	<1
Ethylbenzene	ug/L	1	NC	<1	<1	NT	<1
Methylene chloride	ug/L	5	NC	NT	<5	NT	<5
Tetrachloroethane	ug/L	1	NC	NT	<1	NT	<1
Tetrachloroethene	ug/L	1	NC	NT	<1	NT	<1
Toluene	ug/L	1	NC	<1	<1	NT	<1
Trichloroethane	ug/L	1	NC	NT	<1	NT	<1
Trichloroethane	ug/L	1	NC	NT	<1	NT	<1
Trichloroethene	ug/L	1	NC	NT	<1	NT	<1
Trichlorofluoromethane	ug/L	5	NC	NT	<5	NT	<5
Vinyl chloride	ug/L	5	NC	NT	<5	NT	<5
Xylenes (Total)	ug/L	3	NC	<1	<3	NT	<3
Dissolved Arsenic	mg/L	0.001	NC	<0.001	<0.001	<0.001	0.004
Dissolved Calcium	mg/L	0.1	NC	103	120	110	130
Dissolved Iron	mg/L	0.1	NC	<0.02	0.22	<0.1	0.13
Dissolved Magnesium	mg/L	0.1	NC	24	26	24	32
Dissolved Sodium	mg/L	1	NC	4.7	2.8	3	4.4
Dissolved Zinc	mg/L	0.004	NC	0.23	0.02	0.015	0.021

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units
NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested. Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-47-89

Analyte	Units	Detection	Tolerance	Dec.	March	March	March	March	Oct.	Nov.	Dec.	March	June	Sept.	Dec.	March	June	Sept.	Dec.	July	Janaury	July	January	July	April	July	October
		Level	Limit	21	24	15	16	28	25	26, 27	26, 27	12,13	10, 11	8, 9	9	18	2, 3	22	21	8	7	28	15	7	15	15	14
				1988	1989	1990dnr	1990	1991	1991 c	1991 d	1991 d	1992	1992	1992	1992	1993	1993	1993	1993	1996	1997	1997	1998	1998	1999	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	850	750		750	950			1081	1137	944	632	736	815	693	687	750	1024	706	744	922	652	934	1075	1039
pH	standard	1 su	6.40-7.96	7.5	7.6		7.2	7.2			7.39	7.32	7.44	8.38	7.29	7.06	7.15	6.97	7.39	7.2	6.83	7.00	7.09	7.14	7.50	7.28	7.07
Temperature	degree F.	0.1	NC												44.2	47.2	57.5	56.7	56.2	NT	NT	58	51.8	60.5	58 2	56 7	56.8
Total Organic Carbon (TOC)	mg/L	0.5	6.72	2.3	2.5		1	4			<1	3.6	1.2	<5	2	13.8	2.5	2	2	3.2	1.4	1	1.1	3.2	<0.50	<0.50	<0.50
Chloride	mg/L	1	40	2.5	5		12	38			46	62		26	18.1	22.1	11.4	10.9	12.7	142.0	81.0	95.0	77.0	92.0	76.0	78.0	79.0
1,4-Dioxane	mg/L	0.001	NC																	0.0016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

uS/cm = Microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter.

NT = Indicator parameter not tested. Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-48-89

Analyte	Units	Detection	Tolerance	January	April	July	October	Janaury	April	July	October	January	April	July	October	January
		Level	Limit	7	15	28	21	16	8	7	12	7	15	15	14	19
				1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000
Specific Conductance	umho/cm	0.001 us/cm	962	1,026	1,039	1,230	837	1,576	1,281	1,177	1,401	1,400	1,480	1,685	1,596	1,627
pH	standard	1 su	6.40-7.96	6.66	6.83	6.91	6.43	6.7	8.53	7.22	6.47	7.06	7.1	7.22	7.13	6.77
Temperature	degree F.	0.1	NC	NT	NT	60.7	54.7	53.4	55.4	60.3	57	54.6	57.4	56.8	55.2	54.5
Total Organic Carbon (TOC)	mg/L	0.5	6.72	6.9	6.4	5.9	6.2	5.6	20	6.1	5.1	5.7	6.9	9.4	6.1	5.2
Chloride	mg/L	1	40	249	244	240	210	200	200	200	190	210	220	220	190	180
1,4-Dioxane	mg/L	0.001	NC	<0.001	<0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter.

Shading = Indicator parameter exceeds tolerance limit for monotoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-49-89

Analyte	Units	Detection	Tolerance	July	January	July	January	July	April	July	October
		Level	Limit	9	7	28	16	6	15	15	14
				1996	1997	1997	1998	1998	1999	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	1,759	1,156	1,545	2,030	1,380	1,861	2,230	2,140
pH	standard	1 su	6.40-7.96	7.06	6.65	6.81	6.68	6.82	7.10	7.24	6.93
Temperature	degree F.	0.1	NC	NT	NT	58.3	49.6	58.4	53.9	56.8	54.1
Total Organic Carbon (TOC)	mg/L	0.5	6.72	12	15	16	15	19	13	16	12
Chloride	mg/L	1	40	463	414	210	400	400	410	390	350
1,4-Dioxane	mg/L	0.001	NC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-50-89

Analyte	Units	Detection	Tolerance	January	April	July	October	Janaury	April	July	October	April	July	October	January
		Level	Limit	7	15	28	21	16	8	6	12	15	15	14	19
				1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	2000
Specific Conductance	umho/cm	0.001 us/cm	962	958	992	1,230	890	1,722	1,535	1,198	1,647	1,624	1,898	1,805	1,749
pH	standard	1 su	6.40-7.96	6.66	6.63	6.92	6.43	6.61	6.98	6.83	6.41	7.10	7.11	6.88	6.76
Temperature	degree F.	0.1	NC	NT	NT	58.5	54.1	50.5	54.4	58.7	55.5	55.3	56.1	54.5	53.9
Total Organic Carbon (TOC)	mg/L	0.5	6.72	4.2	4.7	5.5	5.8	9.1	25.0	10.0	8.6	8.4	11.0	7.8	7.1
Chloride	mg/L	1	40	213	217	260	280	250	280	280	270	250	240	220	200
1,4-Dioxane	mg/L	0.001	NC	<0.001	0.0021	0.003	0.004	0.004	0.004	0.004	0.005	0.006	0.006	0.008	0.012

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-65-90

Analyte	**Units**	**Detection Level**	**Tolerance Limit**	**July 8 1996**	**January 8 1997**	**July 28 1997**	**Janaury 15 1998**	**July 7 .1998**	**April 15 1999**	**July 15 1999**	**October 14 1999**
Specific Conductance	umho/cm	0.001 us/cm	962	387	396	309	448	302	355	429	401
pH	standard	1 su	6.40-7.96	8.38	7.81	8.35	8.7	8.49	8.9	8.35	7.96
Temperature	degree F.	0.1	NC	NT	NT	59.4	54.6	64.1	56.3	66.4	52.3
Total Organic Carbon (TOC)	mg/L	0.5	6.72	3.6	1.1	1	1.4	2.4	1.4	0.79	0.85
Chloride	mg/L	1	40	8.1	6.9	5.4	6	6.2	5.4	5.4	3.7

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-66-90

Analyte	**Units**	**Detection Level**	**Tolerance Limit**	**July 9 1996**	**January 7 1997**	**July 28 1997**	**January 15 1998**	**July 6 1998**	**April 15 1999**	**July 15 1999**	**October 14 1999**
Specific Conductance	umho/cm	0.001 us/cm	962	383	471	388	503	360	477	604	567
pH	standard	1 su	6.40-7.96	7.28	7.52	7.60	7.17	7.49	7.80	7.77	7.56
Temperature	degree F.	0.1	NC	NT	NT	57.3	51.4	56.9	51.9	52.9	51.4
Total Organic Carbon (TOC)	mg/L	0.5	6.72	1.3	1.3	1.1	1.6	2.7	0.77	1.1	3.2
Chloride	mg/L	1	40	22	23	19	20	20	27	22	19

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/l = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-68-90

Analyte	**Units**	**Detection**	**Tolerance**	**July**	**January**	**July**	**January**	**July**	**April**	**July**	**October**
		Level	**Limit**	**9**	**7**	**29**	**15**	**6**	**15**	**15**	**14**
				1996	**1997**	**1997**	**1998**	**1998**	**1999**	**1999**	**1999**
Specific Conductance	umho/cm	0.001 us/cm	962	1,103	904	1,007	1,364	961	1,266	932	1,400
pH	standard	1 su	6.40-7.96	7.3	6.75	6.72	6.69	6.85	7.20	7.33	6.95
Temperature	degree F.	0.1	NC	NT	NT	50.3	49.4	60.8	49.9	56.6	49.5
Total Organic Carbon (TOC)	mg/L	0.5	6.72	4.1	5.3	3.8	4.0	14.0	3.5	3.3	4.4
Chloride	mg/L	1	40	207	209	220	210	220	220	220	210
1,4-Dioxane	mg/L	0.001	NC	0.0094	0.013	0.011	0.018	0.018	0.018	0.012	0.019

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-71-90

Analyte	Units	Detection	Tolerance	July	January	July	January	July	April	July	October
		Level	Limit	9	8	28	15	7	15	15	14
				1996	1997	1997	1998	1998	1999	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	540	524	478	686	496	641	827	794
pH	standard	1 su	6.40-7.96	7.87	7.33	7.70	7.28	7.15	7.80	7.98	7.58
Temperature	degree F.	0.1	NC	NT	NT	55.7	52.4	57.8	53.3	53.1	51.1
Total Organic Carbon (TOC)	mg/L	0.5	6.72	1	0.9	0.8	0.9	4.4	<0.50	<0.50	<0.50
Chloride	mg/L	1	40	96	89	98	100	89	99	110	120

uS/cm = microsiemens per centimeter. mg/l = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-76-91

Analyte	Units	Detection	Tolerance	January	April	July	October	January	April	July	October	January	April	July	October	January
		Level	Limit	7	15	29	21	15	8	6	12	8	15	15	14	19
				1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000
Specific Conductance	umho/cm	0.001 us/cm	962	769	800	842	605	1,092	1,086	772	1,124	1,100	1,242	1,012	1,100	1,306
pH	standard	1 su	6.40-7.96	7.14	7.17	6.76	6.33	6.86	7.23	6.96	6.80	6.52	7.49	7.68	7.15	6.95
Temperature	degree F.	0.1	NC	NT	NT	55.4	52.0	49.7	55.8	57.0	60.0	51.7	53.2	62.3	52.9	54.5
Total Organic Carbon (TOC)	mg/L	0.5	6.72	2.2	2.2	2.1	3.7	2.5	3.2	2.9	2.4	7.3	2.0	2.2	3.4	2.2
Chloride	mg/L	1	40	136	138	140	140	140	140	140	130	140	140	140	130	130
1,4-Dioxane	mg/L	0.001	NC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/l = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-77-91

Analyte	Units	Detection	Tolerance	January	April	July	October	January	April	July	October	January	April	July	October	January
		Level	Limit	7	15	29	21	15	8	6	12	9	15	15	14	19
				1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000
Specific Conductance	umho/cm	0.001 us/cm	962	724	1,335	808	572	1,263	1,144	833	955	950	1,153	861	1,000	1,132
pH	standard	1 su	6.40-7.96	6.92	6.92	6.78	6.36	6.60	7.14	7.14	6.78	6.43	7.41	7.65	7.07	6.83
Temperature	degree F.	0.1	NC	NT	NT	56.1	51.8	51.7	55.8	68.7	68.8	49.1	53.4	60.5	53.8	53.9
Total Organic Carbon (TOC)	mg/L	0.5	6.72	2.2	2.4	2.3	2.5	2.7	3.2	3.6	2.6	3.7	4.2	3.6	1.7	2.7
Chloride	mg/L	1	40	121	131	120	110	150	120	87	81	88	95	88	82	85
1,4-Dioxane	mg/L	0.001	NC	<0.001	0.0016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NT	NT	<0.001	<0.001	0.001

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-78-91

Analyte	Units	Detection	Tolerance	July	July	July	January	July	April	July	October
		Level	**Limit**	**9**	**7**	**29**	**15**	**6**	**15**	**15**	**14**
				1996	**1997**	**1997**	**1998**	**1998**	**1999**	**1999**	**1999**
Specific Conductance	umho/cm	0.001 us/cm	962	665	629	638	874	629	952	828	930
pH	standard	1 su	6.40-7.96	7.2	6.93	6.49	6.58	6.99	7.39	7.53	7.10
Temperature	degree F.	0.1	NC	NT	NT	56.1	52.5	58.8	51.8	64.5	55.8
Total Organic Carbon (TOC)	mg/L	0.5	6.72	2.1	2.2	1.7	2.0	2.4	1.1	5.8	3.2
Chloride	mg/L	1	40	54	66	110	110	130	120	120	100

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-81-91

Analyte	Units	Detection	Tolerance	July	Janaury	July	January	July	April	July	October
		Level	Limit	9	7	29	15	6	15	15	14
				1996	1997	1997	1998	1998	1999	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	586	623	545	745	554	894	764	930
pH	standard	1 su	6.40-7.96	7.38	7.01	7.16	6.71	7.2	7.41	7.58	7.14
Temperature	degree F.	0.1	NC	NT	NT	54.7	47	55.4	50.5	60.5	50.7
Total Organic Carbon (TOC)	mg/L	0.5	6.72	1.5	2.2	0.9	1.4	0.79	0.88	0.96	3.0
Chloride	mg/L	1	40	39.0	35.0	42.0	48.0	57.0	57.0	62.0	65.0

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-83-90

Analyte	Units	Detection	Tolerance	January	April	July	October	January	April	July	October	January	April	July	October	January
		Level	Limit	7	15	29	21	15	8	7	12	9	15	15	14	19
				1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	1999	2000
Specific Conductance	umho/cm	0.001 us/cm	962	715	652	444	343	555	542	463	580	620	578	451	700	742
pH	standard	1 su	6.40-7.96	7.25	8.04	7.19	6.7	7.5	7.35	6.82	7.46	7.38	7.7	7.72	7.45	7.55
Temperature	degree F.	0.1	NC	NT	NT	53.1	48.8	46.1	50.4	54.4	50.6	51.8	50.6	53.7	50.0	49.6
Total Organic Carbon (TOC)	mg/L	0.5	6.72	2.3	1.9	1.2	1.6	1.8	2.3	0.5	4.8	7.6	9.5	1.5	13.0	6.4
Chloride	mg/L	1	40	21.0	23.0	19.0	22.0	22.0	21.0	23.0	21.0	22.0	22.0	25.0	23.0	25.0
1,4-Dioxane	mg/L	0.001	NC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micorgrams per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-86-92

Analyte	Units	Detection	Tolerance	January	April	July	October	January	April	July	October	January	April	July	October
		Level	Limit	8	15	29	21	15	8	6	12	8	15	15	14
				1997	1997	1997	1997	1998	1998	1998	1998	1999	1999	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	959	596	1,231	1,033	1,340	1,401	1,127	1,758	1,700	631	1,456	1,700
pH	standard	1 su	6.40-7.96	6.87	7.47	7.19	6.64	6.61	6.98	6.77	6.42	6.84	7.39	7.37	6.85
Temperature	degree F.	0.1	NC	NT	NT	54.3	54.6	47.9	47.4	60.2	57.2	NT	47	59.1	56.7
Total Organic Carbon (TOC)	mg/l	0.5	6.72	1.9	2.1	1.9	3	3.8	15	2.6	3.4	1.3	6.9	3.1	4.4
Chloride	mg/l	1	40	294	44	410	420	190	120	330	360	310	77	320	82
1,4-Dioxane	mg/l	0.001	NT	NT	NT	NT	0.024	NT	NT	NT	NT	NT	NT	NT	NT
Bromodichloromethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane/Methyl bromide	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorodibromomethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene chloride	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-87-92

Analyte	Units	Detection	Tolerance	July	January	July	January	July	April	July	October
		Level	Limit	9	8	29	15	6	15	15	14
				1996	1997	1997	1998	1998	1999	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	1,092	1,057	1,353	1,534	1,106	1,220	1,533	1,700
pH	standard	1 su	6.40-7.96	7.33	6.46	6.54	6.54	6.77	7.44	7.49	6.93
Temperature	degree F.	0.1	NC	NT	NT	54.2	49.1	58.4	51.8	57.5	57.0
Total Organic Carbon (TOC)	mg/l	0.5	6.72	3.5	2.7	3.7	2.9	3.5	6.3	3.9	3.0
Chloride	mg/l	1	40	220	351	310	300	320	350	360	330
Bromodichloromethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane/Methyl bromide	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Chlorodibromomethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Methylene chloride	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride	ug/L	5	NC	12	21	17	15	43	21	9	6

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-89-92

Analyte	Units	Detection	Tolerance	July	October	January	April	July	October	January
		Level	Limit	30	12	8	15	15	14	20
				1998	1998	1999	1999	1999	1999	2000
Specific Conductance	umho/cm	0.001 us/cm	962	641	933	920	816	988	1,200	1,070
pH	standard	1 su	6.40-7.96	7.27	6.67	6.99	7.51	7.68	7.08	6.68
Temperature	degree F.	0.1	NC	55.3	55.4	84	51.8	59.8	53.1	NM
Total Organic Carbon (TOC)	mg/l	0.5	6.72	NT	1.4	NT	1.4	<0.50	1.1	<0.50
Chloride	mg/l	1	40	NT	95	84	160	160	170	110
1,4-Dioxane	mg/l	0.001	NC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Bromodichloromethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Bromomethane/Methyl bromide	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5
Chloroform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Chlorodibromomethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Methylene chloride	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micorgrams per liter. s.u. standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-90-92

Analyte	Units	Detection	Tolerance	July	Janaury	July	January	July	July	July	July	October	April	July	October
		Level	Limit	9	8	29	15	6	30	30	30	12	15	15	14
				1996	1997	1997	1998	1998	1998*	1998**	1998***	1998	1999	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	1,509	1,210	1,427	1,654	1,289	1,140	1,102	1,110	1,639	1,479	1,647	2,000
pH	standard	1 su	6.40-7.96	7.53	6.81	6.96	6.7	7.23	7.15	7.36	7.35	6.65	7.59	7.72	7.07
Temperature	degree F.	0.1	NC	NT	NT	52.3	50.9	59.4	56	55.2	55.9	55.2	51.3	57.7	54.9
Total Organic Carbon (TOC)	mg/l	0.5	6.72	1.7	1.7	1.8	1.5	1.6	NT	NT	NT	1.8	3.3	1.4	0.83
Chloride	mg/l	1	40	548	597	510	430	490	NT	NT	NT	390	640	600	510
Bromodichloromethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane/Methyl bromide	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorodibromomethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene chloride	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/L	1	NC	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/L	5	NC	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride	ug/L	5	NC	48	60	32	44	100	99	120	92	22	77	78	51

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-94-92

Analyte	Units	Detection	Tolerance	January	April	July	January	July	July	July	July	October	April	July	October
		Level	Limit	8	15	29	16	6	30	30	30	12	15	15	14
				1997	1997	1997	1998	1998	1998*	1998**	1998***	1998	1999	1999	1999
Specific Conductance	umho/cm	0.001 us/cm	962	955	1,006	1,126	1,354	1,061	930	925	924	1,388	1,049	1,298	1,600
pH	standard	1 su	6.40-7.96	6.67	6.85	6.95	7.01	6.96	7.28	7.13	7.18	6.47	7.59	7.62	6.98
Temperature	degree F.	0.1	NC	NT	NT	54.4	49.2	60.3	56.2	54.6	55.1	55	51.1	57.9	52.2
Total Organic Carbon (TOC)	mg/L	0.5	6.72	3.3	NT	7.8	4.6	3.8	NT	NT	NT	6.2	5.4	3.4	2.4
Chloride	mg/L	1	40	265	NT	260	250	290	NT	NT	NT	270	260	280	290
1,4-Dioxane	mg/L	0.001	NC	NT	0.0014	0.093	0.061	0.14	0.091	0.087	0.09	0.077	0.09	0.079	0.12

uS/cm = micsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT Indicator parameter not tested.

Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-95-92

Analyte	Units	Detection	Tolerance	July	October	January	April	July	October	January
		Level	Limit	30	12	8	15	15	14	20
				1998	1998	1999	1999	1999	1999	2000
Specific Conductance	umho/cm	0.001 us/cm	962	916	1,315	1,200	1,370	1,284	1,300	1,132
pH	standard	1 su	6.40-7.96	6.46	6.53	6.37	7.46	7.58	6.94	6.34
Temperature	degree F.	0.1	NC	55.9	60.2	49.1	49.2	59.9	55.8	52
Total Organic Carbon (TOC)	mg/L	0.5	6.72	NT	NT	2.7	2.6	3.3	4.7	1.9
Chloride	mg/L	1	40	NT	NT	170	230	270	210	210
1,4-Dioxane	mg/L	0.001	NC	0.004	0.006	0.002	0.004	0.003	0.003	0.003

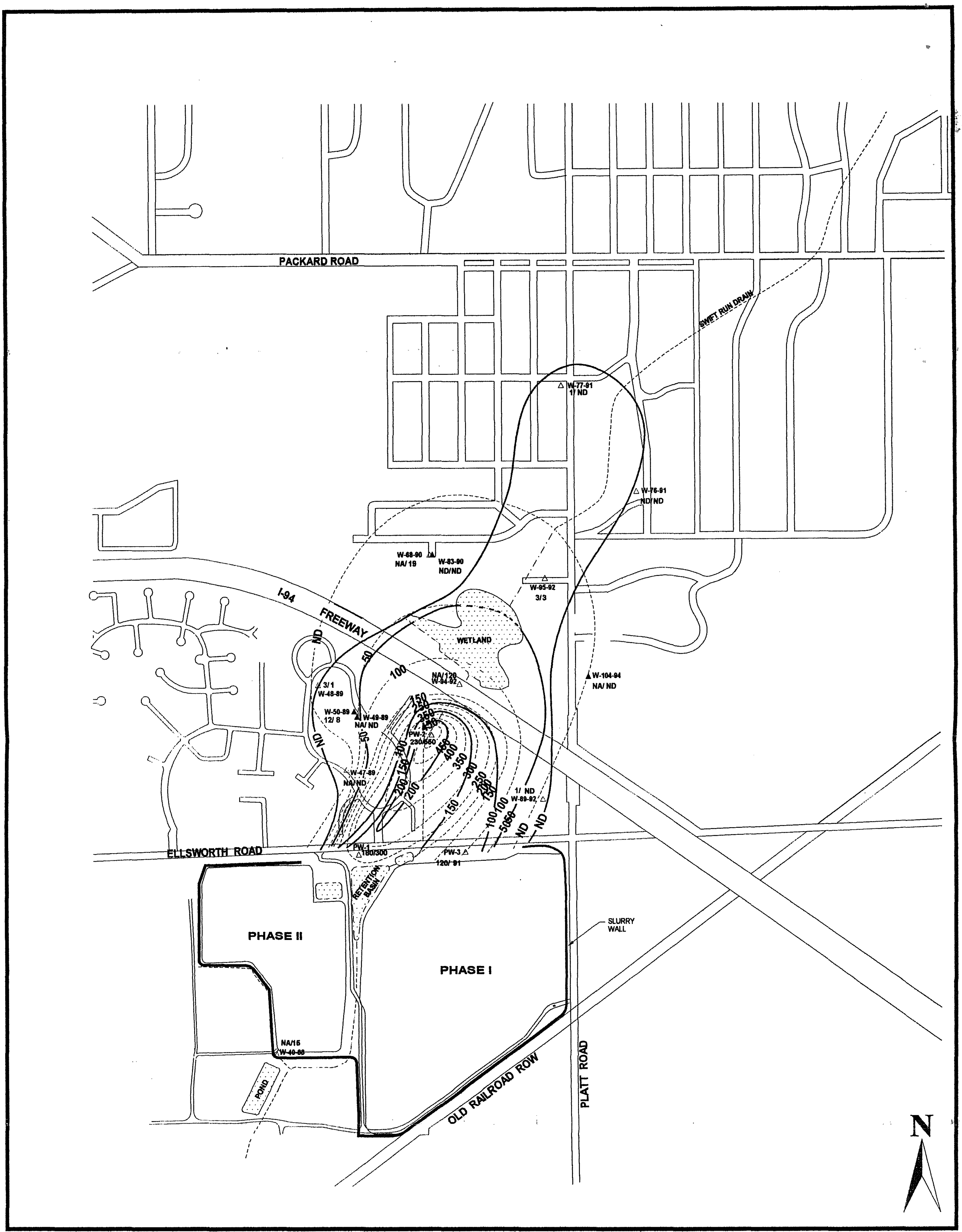
uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested. Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1997 not shown on this data base table. < = less than current detection limit.

City of Ann Arbor Landfill
Ann Arbor, Michigan
Data Base Summary
MONITORING WELL W-70-92

	Analyte	Units	Detection	Tolerance	July	July	July	July
			Level	Limit	9	28	7	15
					1996	1997	1998	1999
	Specific Conductance	umho/cm	0.001 us/cm	962	567	489	498	772
	pH	standard	1 su	6.40-7.96	7.76	7.47	7.42	7.54
	Temperature	degree F.	0.1	NC	NT	55	60.4	51.6
	Dissolved Oxygen	mg/L	0.05	NC	5.4	1.04	1.03	NT
	Oxygen Saturation	%	1	NC	NT	16	11	NT
	Total Organic Carbon (TOC)	mg/L	0.5	6.72	1.1	0.6	1.8	<0.5
	Chloride	mg/L	1	40	21	30	29	30
	Nitrogen, ammonia	mg/L	0.01	NC	<0.5	<0.01	0.02	0.06
	Nitrogen, nitrate	mg/L	0.05	NC	3	5.9	6	3.7
	Bicarbonate Alkalility	mg/L	5	NC	300	290	300	300
	Chemical Oxygen Demand	mg/L	3	NC	5.2	<3	11	<3.0
	Sulfates	mg/L	1	NC	79	76	70	72
	Benzene	ug/L	1	NC	<1	<5	NT	<5
	Bromodichloromethane	ug/L	1	NC	NT	<1	NT	<1
	Bromoform	ug/L	1	NC	NT	<1	NT	<1
	Bromomethane/Methyl bromide	ug/L	5	NC	NT	<5	NT	<5
	Carbon tetrachloride	ug/L	1	NC	NT	<1	NT	<1
	Chlorobenzene	ug/L	1	NC	NT	<1	NT	<1
	Chloroethane	ug/L	5	NC	NT	<5	NT	<5
	Chloroform	ug/L	1	NC	NT	<1	NT	<1
	Chlorodibromomethane	ug/L	1	NC	NT	<1	NT	<1
1,1-	Dichloroethane	ug/L	1	NC	NT	<1	NT	<1
1,2-	Dichloroethane	ug/L	1	NC	NT	<1	NT	<1
1,1-	Dichloroethene	ug/L	1	NC	NT	<1	NT	<1
cis-1,2-	Dichloroethene	ug/L	1	NC	NT	<1	NT	<1
trans-1,2-	Dichloroethene	ug/L	1	NC	NT	<1	NT	<1
1,2-	Dichloropropane	ug/L	1	NC	NT	<1	NT	<1
cis-1,3-	Dichloropropene	ug/L	1	NC	NT	<1	NT	<1
trans-1,3-	Dichloropropene	ug/L	1	NC	NT	<1	NT	<1
	Ethylbenzene	ug/L	1	NC	<1	<1	NT	<1
	Methylene chloride	ug/L	5	NC	NT	<5	NT	<5
1,1,2,2-	Tetrachloroethane	ug/L	1	NC	NT	<1	NT	<1
	Tetrachloroethene	ug/L	1	NC	NT	<1	NT	<1
	Toluene	ug/L	1	NC	<1	<1	NT	<1
1,1,1-	Trichloroethane	ug/L	1	NC	NT	<1	NT	<1
1,1,2-	Trichloroethane	ug/L	1	NC	NT	<1	NT	<1
	Trichloroethene	ug/L	1	NC	NT	<1	NT	<1
	Trichlorofluoromethane	ug/L	5	NC	NT	<5	NT	<5
	Vinyl chloride	ug/L	5	NC	NT	<5	NT	<5
	Xylene (Total)	ug/L	3	NC	<1	<3	NT	<3
	Dissolved Arsenic	mg/L	0.001	NC	<0.001	<0.001	<0.001	0.001
	Dissolved Calcium	mg/L	0.1	NC	102	110	110	130
	Dissolved Iron	mg/L	0.1	NC	<0.02	0.19	0.13	0.12
	Dissolved Magnesium	mg/L	0.1	NC	27	28	26	34
	Dissolved Sodium	mg/L	1	NC	6.2	5.1	5.3	7.2
	Dissolved Zinc	mg/L	0.004	NC	2.42	0.18	0.23	0.27

uS/cm = microsiemens per centimeter. mg/L = milligrams per liter. ug/L = micrograms per liter. s.u. = standard units. NC = Tolerance limit not calculated for this parameter. NT = Indicator parameter not tested.
Shading = Indicator parameter exceeds tolerance limit for monitoring point. Data prior to 1996 not shown on this data base table. < = less than current detection limit.

APPENDIX B
Isoconcentration Maps-January 2000



LEGEND:

W-1-87	Monitor Well Location
OW-2	Observation Well Location
TW-1	Test Well Location
P-1D	Piezometer Well Location
PW-1	Purge Well Location
△	Upper Aquifer Well
▲	Lower Aquifer Well
50	January, 2000 Isoconcentration Contour Line
50	October, 1999 Isoconcentration Contour Line
120 / 91	January, 2000 Concentration / October, 1999 Concentration

NOTES:

1. Base map provided by The City of Ann Arbor.
2. Additional information drawn by Envirographics of Hamburg, MI (810) 231-3025.
3. All units expressed in micrograms per liter (ug/l).
4. ND = below current method detection level.
5. NA = not analyzed.
6. Contour Interval = 50 ug/l.

SCALE:

1 Inch = 800 Feet

0' 400' 800' 1600'

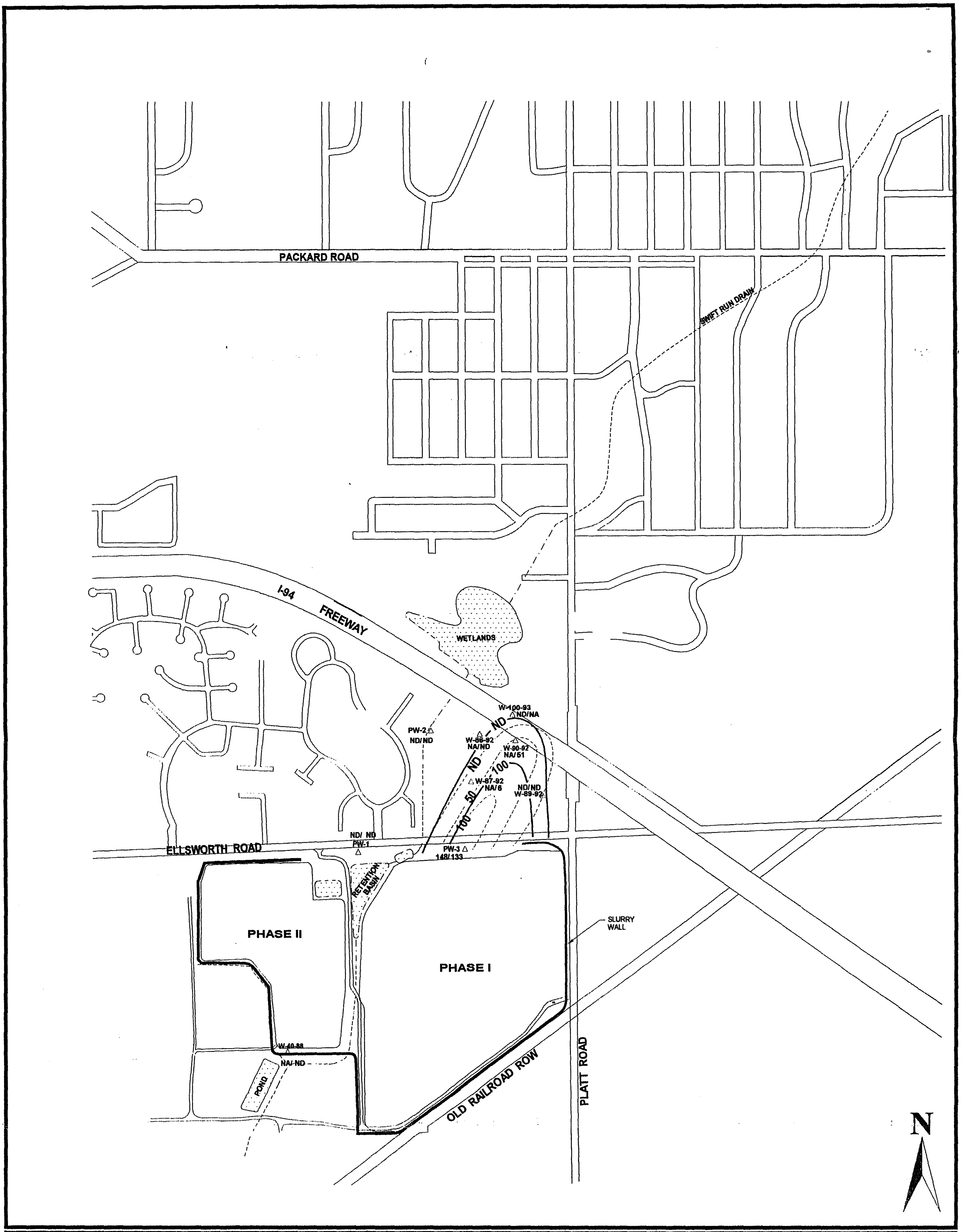
1-4-DIOXANE ISOCONCENTRATION MAP
JANUARY 2000

CITY OF ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

Insight
Environmental Services, Inc.
2123 Pless Drive
Brighton, MI 48114-9463
(810) 225-6271

2357/AADX1-00/2-17-00

FIGURE 4



LEGEND:

W-1-87 Monitor Well Location
OW-2 Observation Well Location
TW-1 Test Well Location
P-1D Piezometer Well Location
PW-1 Purge Well Location
△ Upper Aquifer Well
▲ Lower Aquifer Well

50 January, 2000 Isoconcentration Contour Line
50 October, 1999 Isoconcentration Contour Line
148 / 133 January, 2000 Concentration / October, 1999 Concentration

NOTES:

1. Base map provided by The City of Ann Arbor.
2. Additional information drawn by Envirographics of Hamburg, MI (810) 231-3025.
3. Total VOCs as determined by Method 8260.
4. All units expressed in micrograms per liter (ug/l).
5. ND = below current method detection level.
6. NA = Not Analyzed.
7. Contour Interval = 100 ug/l.
8. Monitoring Well MW-86-92 was frozen on the day of the sampling survey.

SCALE:

1 Inch = 800 Feet

0' 400' 800' 1600'

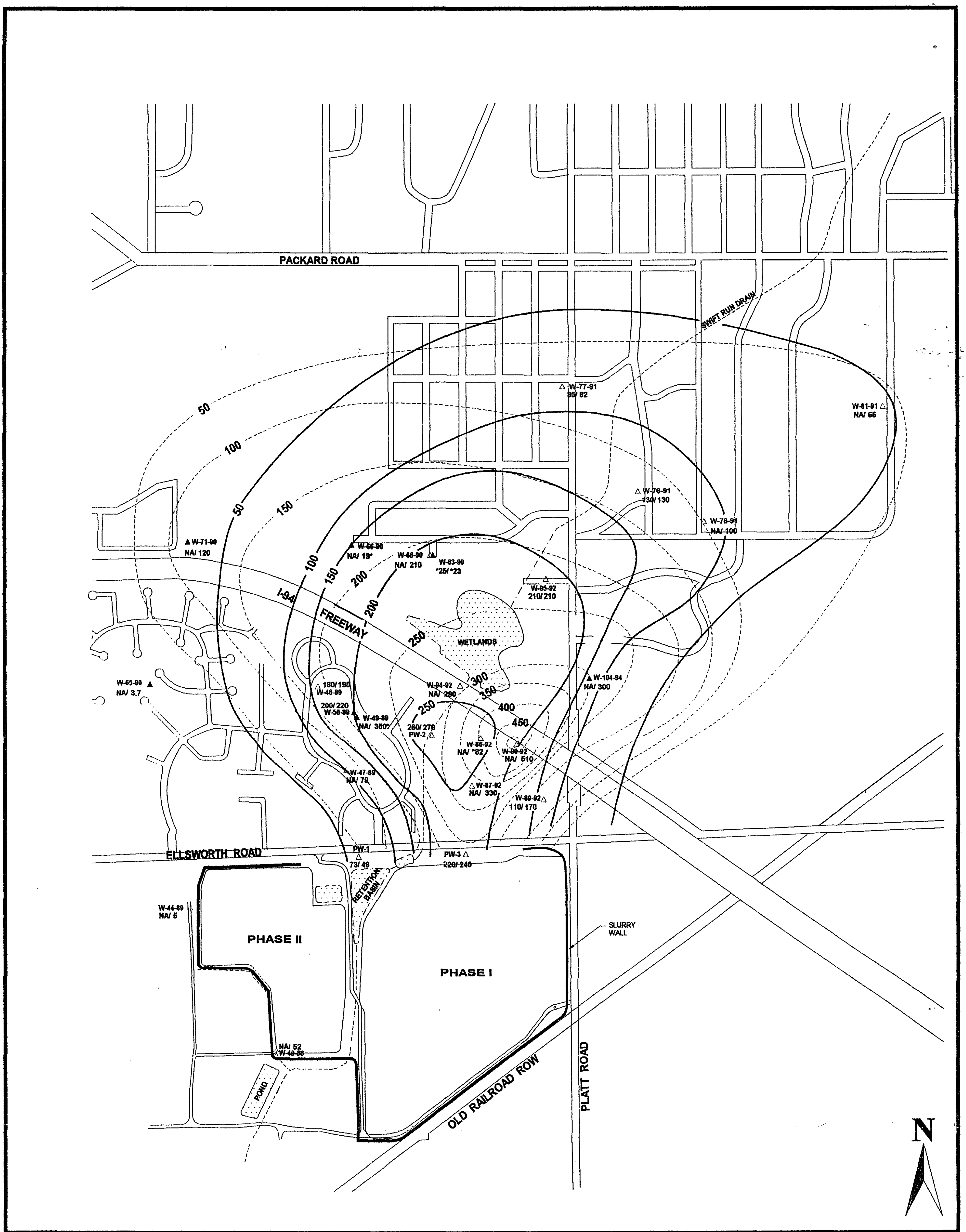
TOTAL VOCS ISOCONCENTRATION MAP
JANUARY 2000

CITY OF ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

Insight
Environmental Services, Inc.
2123 Pless Drive
Brighton, MI 48114-9463
(810) 225-6271

2357/AAVOC1-00/2-17-00

FIGURE 5



LEGEND:

W-1-87	Monitor Well Location
OW-2	Observation Well Location
TW-1	Test Well Location
P-1D	Piezometer Well Location
PW-1	Purge Well Location
△	Upper Aquifer Well
▲	Lower Aquifer Well
50	January, 2000 Isoconcentration Contour Line
50	October, 1999 Isoconcentration Contour Line
220/ 240	January, 2000 Concentration / October, 1999 Concentration

NOTES:

1. Base map provided by The City of Ann Arbor.
2. Additional information drawn by Envirographics of Hamburg, MI (810) 231-3025.
3. All units expressed in milligrams per liter (mg/l).
4. NA = Not Analyzed.
5. Contour Interval = 50 ug/l.
6. * Well was not utilized to prepare this map.

SCALE:

1 Inch = 800 Feet

0' 400' 800' 1600'

CHLORIDE ISOCONCENTRATION MAP
JANUARY 2000

CITY OF ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

Insight
Environmental Services, Inc.
2123 Pless Drive
Brighton, MI 48114-9463
(810) 225-6271

2357/AACL1-00/2-17-00

FIGURE 6

APPENDIX C
Accepted Analytical Methods

ACCEPTED ANALYTICAL METHODS

TEST PARAMETERS	LABORATORY ANALYTICAL DETECTION LIMITS (ug/l)	SUGGESTED ANALYTICAL METHODS (SW-846-EPA)
Inorganics:		
pH	1 s.u.	150.1
Specific Conductivity	0.001 uS/cm	120.1
Temperature	0.1°c	
Chloride	1,000	325.2/4500c
Organics:		
Bromodichloromethane	1	8260
Bromoform	1	8260
Carbon Tetrachloride	1	8260
Chlorobenzene	1	8260
Chloroethane	5	8260
Chloroform	1	8260
Dibromochloromethane	1	8260
o-Dichlorobenzene	1	8260
p-Dichlorobenzene	1	8260
1,1-Dichloroethane	1	8260
1,.2-Dichloroethane	1	8260
1,1-Dichloroethylene	1	8260
cis-1,2-Dichloroethylene	1	8260
trans-1,2-dichloroethylene	1	8260
1,2-Dichloropropane	1	8260
cis-1,3-Dichloropropene	1	8260
trans-1,3-Dichloropropene	1	8260
Methyl bromide	5	8260
Methyl chloride	5	8260
Methyl bromide	1	8260
Methylene chloride	5	8260
Methylene bromide	1	8260
Methyl iodide	1	8260
1,1,1,2-Tetrachloroethane	1	8260
1,1,2,2-Tetrachloroethane	1	8260
Tetrachloroethylene	1	8260
1,1,1-Trichloroethane	1	8260
1,1,2-Trichloroethane	1	8260
Trichloroethylene	1	8260
Trichlorofluoromethane	5	8260
1,2,3-Trichloropropane	1	8260
Vinyl chloride	5	8260
Benzene	1	8260
Ethyl benzene	1	8260
Sytrene	1	8260
Toluene	1	8260
Xylenes (totals)	1	8260
Acetone	25	8260
Acrylonitrile	5	8260
Bromochloromethane	1	8260
Carbon disulfide	5	8260
1,2-Dibromo-3-chloropropane	5	8260
1,2-Dibromoethane	1	8260
Methyl ethyl ketone (MEK)	5	8260
4-Methyl-2-pentanone (MIBK)	5	8260
trans-1,4-dichloro-2-butene	1	8260
2-Hexanone	5	8260
Vinyl Acetate	1	8260

APPENDIX D
Sample Preservation and Container Size

SAMPLE PRESERVATION AND CONTAINER SIZE

Test Parameter	Bottle Type	Bottle Size	Preservative	Holding Time
Ph	None	None	None	Field
Specific Conductance	None	None	None	Field
Temperature	None	None	None	Field
ORP	None	None	None	Field
Chloride	Plastic	1 liter	None	28 days
1-4,Dioxane	Glass Vial	2-40 ml	HCL	14 days
VOC's	Glass Vial	2-40 ml	HCL	14 days

APPENDIX E
Field Sampling Form

INSIGHT ENVIRONMENTAL SERVICES, INC.
GROUNDWATER SAMPLING RECORD

PROJECT #:______________________________

SITE NAME:______________________________

SITE ADDRESS:______________________________

PERSONNEL:______________________________

OBSERVERS:______________________________

DATE:______________________

SAMPLE LOCATION:____________

AMBIENT TEMPERATURE (F°):________

TOP OF CASING ELEVATION:________

WATER LEVEL ELEVATION:________

SAMPLING EQUIPMENT:

____ Bailer

____ Dedicated Bailer

____ Peristaltic

____ Dedicated Pump System

____ Submersible Pump

____ Other ____________________

FIELD MEASUREMENTS:
(measured from top of casing)

__________ Previous Water Level (Ft.)

__________ Total Depth of Well (Ft.)

__________ Depth to Water (Ft.)

__________ Water Vol. in Well (Gal.)

__________ Purge Volume Anticipated (3 well volumes)

__________ Time Well Opened

__________ Time Of Water Level Measurement

__________ Time Purged (Eastern Standard)

__________ Actual Volume Removed (Gal.)

__________ Time Sampled (Eastern Standard)

__________ Weather Conditions

Disposal Method for Purged Water:______________________________

WELL DIAMETERS:

1-in. O.D. = 0.04 gal./ft.

2-in. O.D. = 0.17 gal./ft.

4-in. O.D. = 0.66 gal./ft.

5-in. O.D. = 1.0 gal./ft.

6-in. O.D. = 1.5 gal./ft.

CALCULATE WELL VOLUME:

Well Volume (gal.) = (Depth of Well-Depth to Water) X ______(gal.ft.)

FIELD PARAMETERS	LAST READING	FIRST READING	SECOND READING	THIRD READING	FOURTH READING
Volume of water removed (gallons)					
Time of Measurement					
Specific Conductivity (μS)					
Temperature (°F)					
ph (Standard Units):					
Other:_ ORP ______ DO % SAT					

COMMENTS: ____

____

____

____

APPENDIX F
Quality Assurance Plans

ANN ARBOR TECHNICAL SERVICES, INC.
Consultants in Chemistry & Environmental Science
290 South Wagner Road, Ann Arbor, Michigan 48103
Tel. 734/995-0995 Fax. 734/995-3731

Fax Cover Page

Important: ☒ **Urgent:** ☐

Date: 2/24/00 **Time:** 6:00PM **Project #:** 34103

Recipient Information:

To:	Mark Sweatman	Company:	Insight	Fax #:	810-225-6279
To:		Company:		Fax #:	
To:		Company:		Fax #:	
To:		Company:		Fax #:	

Number of Pages (including cover page): 1

From: Mary Bennett

Message: Mark, Regarding your request for the ATS Laboratory Quality Assurance Plan to include with the revised City Of Ann Arbor Landfill monitoring plan, I have changed my mind and will not be sending you either the QA plan or our SOP for 1,4-Dioxane. My reasons are that the SOP is on file with the MDEQ (and available publicly through Bob Avery, Director of their lab). Similarly, the ATS QA Program document is also on file with the MDEQ as part of ATS's lab certification from the State. ATS considers both ofthese documents confidential and we do not make them available for widespread distribution. I suggest you reference their availability at the MDEQ offices in your monitoring plan.
Mary Bennett

A4 to A4

BA Brighton
Analytical
L.L.C.

2105 Pless Drive • Brighton, Michigan 48114 • Phone (810) 229-7575 • Fax (810) 229-8650

QUALITY ASSURANCE PROGRAM PLAN
(QAPP)

For

Brighton Analytical, LLC
2105 Pless Drive
Brighton, Michigan 48114
(810) 229-7575

SOP NO.: BA012

Revision 3

Date Effective: 5/26/99

NOTE: This stamp must appear in red. Any other color indicates an uncontrolled copy which may not reflect current procedure	Brighton Analytical, Inc. Controlled Document Copy # 05

QUALITY ASSURANCE PROGRAM PLAN
(QAPP)

For

Brighton Analytical, LLC
2105 Pless Drive
Brighton, Michigan 48114
(810) 229-7575

SOP NO.: BA012

Revision 3

Date Effective: 5/26/99

QUALITY ASSURANCE POLICY STATEMENT

This is the comprehensive Quality Assurance Program Plan for Brighton Analytical, LLC. The QAPP outlines the requirements that employs of Brighton Analytical guarantee that all the analytical results generated are defensible and fit for their intended use. The objective of this QA Manual is to be viewed as a set of instructions that provide guidance on laboratory policies and its quality control practices in the laboratory. It can also be used as a training manual for new employees. All laboratory employees are required to follow the procedures set up in this manual to provide high quality analytical data.

This document is to be used as a reference document and is established to maintain laboratory practices that will ensure both the reliability and defensibility of data generated in the laboratory. It is intended for use by all personnel of Brighton Analytical, LLC employees who come in contact with samples and their reported data. Unless otherwise noted, the document is used for all NPDES, RCRA, Drinking Water analysis, and non-regulated testing.

Brighton Analytical, LLC is dedicated to the concept of continuous improvement in all facets of our operation and to generate high quality data. The quality assurance program plan (QAPP) has been documented and will be continuously updated for the benefit of our employees and customers to outline the quality assurance practices that have been developed and implemented.

This manual is the sole property of Brighton Analytical, LLC and duplication of this manual, in whole or part, for use outside the company is not allowed without prior consent.

Michelle M. Cyr
Quality Assurance Manager
Brighton Analytical, LLC

5/26/99
Date

William J. Topolski
Director of Laboratory Services
Brighton Analytical, LLC

5/26/99
Date

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QA Plan Elements

SECTION **PAGE**

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FIGURES

APPENDICES

DISTRIBUTION OF QA MANUAL

Copy #	Person Responsible
Master (QA Office)	Michelle Cyr
01	William Topolski
02	Debbie Hoffner
03	Brian Ciupak
04	Gerry Hughes
05	James Kenyon

SECTION 1.0

TABLE OF CONTENTS

If you have any questions, please call.

Sincerely,

Patrick J Brennan

Patrick J. Brennan
Geologist
Jackson District WMD
517-780-7935

pjb:red

cc: Mr. John Craig, DEQ
Ms. Carolyn B. Parker, DEQ

ATTACHMENT H

ADDENDUM TO GAS MONITORING PLAN REVISION

JUNE 4, 2021

TETRA TECH

June 4, 2021

Mr. Brett Coulter
District Geologist
Materials Management Division
Michigan Department of Environmental, Great Lakes and Energy
301 East Louis Glick Hwy
Jackson, Michigan 49201

SUBJECT: Ann Arbor Landfill
Gas Monitoring Plan Revisions

Dear Mr. Coulter,

The City of Ann Arbor conducts quarterly gas monitoring surveys to fulfill the requirements of the Natural Resources and Environmental Protection Act (NREPA), 1994 Public Act 451, as amended and the rules promulgated under Part 115, specifically R 299.4433 *Type II landfill operation; explosive gas control and monitoring*. Quarterly gas monitoring surveys have been completed for the Ann Arbor landfill since April 1997, in accordance with the Landfill Gas Monitoring Program (LGMP) authored by RMT, Inc. of Ann Arbor, Michigan in October 1997, Addendum #1 submitted on October 27, 1997 by RMT, Inc. (**Attachment A**) and addendums submitted on March 28 and May 1, 2008 by Tetra Tech (formerly GeoTrans, Inc.) (**Attachment B1** and **B2** respectively). A copy of the First Quarter 2011 Gas Monitoring Report is also included as **Attachment B3**. Section 5 of this report outlines changes to the indoor gas monitoring locations at the onsite the Materials Recovery Facility (MRF) building due to a building addition and reconfiguration.

Gas monitoring at the landfill is currently completed on a quarterly basis as indicated on **Attachment C**. Quarterly monitoring events occur in January and July and includes the monitoring of 48 locations. Semi-annual monitoring occurs in October and includes the monitoring of 60 locations. Annual monitoring occurs in April and includes the monitoring of 79 locations.

Historical data from January 1997 through April 2021 has been compiled in **Attachment D**. Tetra Tech personnel have reviewed the historical monitoring data and are proposing changes to reduce the number of locations monitored during the annual event in April of each year.

The north side methane collection system (NSMCS) and ten perimeter extraction wells (PEWs) were installed along the south side of Ellsworth Road in 2005 to prevent methane gas from migrating beyond the AALF property boundary. Since the installation of the NSMCS, off-site migration has only occurred when the system has been inoperable. As a result of the effectiveness of this system, Tetra Tech, on behalf of the City of Ann Arbor, is proposing a reduction in the number of locations monitored during the annual gas monitoring event in April of each year.

Tetra Tech is requesting removal of the following 20 locations, from the annual monitoring list:

- Water manhole W;
- Sanitary sewer S4;
- Storm sewers R3, R4 and R5;
- Gas probes GP-10-99, GP-11-99 and GP-12-99; and
- Concession building and area utilities (5 drains, 1 sump, 1 sanitary sewer, 5 storm sewers).

This change to the gas monitoring plan will reduce the annual gas monitoring to 59 locations as indicated on **Attachment C**. Sanitary sewer S4 and water manhole W included in the removal list above were also part of the semi-annual monitoring list. Sanitary sewer S4 is located in the north lane of Ellsworth Road at the intersection of Ellsworth Road and Braeburn Circle and water manhole W is located in the south lane of Ellsworth Road. These locations are being proposed for removal from both the semi-annual and annual list due to the safety hazards associated with monitoring the locations within the street traffic. Two locations, MP and TPG-1 were previously identified as both semi-annual and annual sampling locations. Due to this redundancy, the list has been edited to reflect semi-annual in the table. Based on the removal and edits to these locations in the monitoring plan, the semi-annual locations will be reduced to 59 locations and the quarterly event will remain at 48 locations. There are no locations that are only visited annually. A figure of the current and proposed changes to gas monitoring locations is included as **Attachment E**. The ambient gas monitoring locations (MP1 through MP-8 and MP-10 through MP-29) will remain the same and are indicated on **Attachment F**.

The gas probe locations (GP-10-99, GP-11-99 and GP-12-99) will not be abandoned at this time. These gas wells will remain in place and will continue to be maintained by the City of Ann Arbor in case the NSMCS has a long term outage or failure that requires resuming gas monitoring at these locations.

Finally, there are two changes from the original LGMP by RMT to address.

1. Appendix A of the LGMP document is a Health and Safety Plan. Tetra Tech maintains a comprehensive Health and Safety Plan that is updated annually. This is available upon request.
2. Section 6.1 Contacts and Communications of the LGMP is outdated. If methane exceedances are detected at or above the lower explosive limit (LEL) in offsite utilities or structures or above 25% of the LEL in on-site facility structures, the following personnel will be notified:

    Michigan Department of Environment, Great Lakes, and Energy
    Brett Coulter
    District Geologist
    517-614-7714

    City of Ann Arbor Public Works Department
    734-794-6350

On behalf of the City of Ann Arbor, Tetra Tech is requesting agreement from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to implement these revisions to the gas sampling plan. If EGLE concurs, implementation of these revisions will occur beginning with the next gas monitoring event at Ann Arbor Landfill.

If you have additional questions, please do not hesitate to contact us.

Sincerely,

Alison Rauss　　　　Patti McCall

Alison Rauss
Senior Project Scientist

Patti McCall, CPG, PWS
Associate Hydrogeologist

cc: Christina Gomes, Recycling and Solid Waste Program Coordinator, City of Ann Arbor
Molly Maciejewski, Public Works Manager, City of Ann Arbor

Attachments

Attachment A	October 1997 Gas Monitoring Plan and October 27, 1997 Addendum #1
Attachment B1	March 28, 2008 Gas Monitoring Plan Addendum
Attachment B2	May 1, 2008 Gas Monitoring Plan Addendum
Attachment B3	Gas Monitoring Report First Quarter 2011
Attachment C	Proposed Gas Monitoring Locations
Attachment D	Historical Data
Attachment E	Proposed Gas Monitoring Locations
Attachment F	Ambient Gas Monitoring Locations

ATTACHMENT A

Landfill Gas Monitoring Plan
Addendum #1
October 27, 1997

This addendum to the City of Ann Arbor Landfill Gas Monitoring Plan has been developed to describe the actions that the City of Ann Arbor is taking in response to gas detections at the perimeter of the City's Landfill. The response actions detailed in addendum supersede requirements in Section 6 of the October 1997 Landfill Gas Monitoring Plan.

Project Background

The City of Ann Arbor's consultant, RMT, Inc. (RMT) installed six pairs of gas monitoring probes around the perimeter of the City's Landfill between October 1 and October 3, 1997. While installing the probes, some suspects odors were detected and gas monitor readings indicated that gas was present at two locations. On October 6, 1997, the newly installed probes were monitored. Methane levels exceeding 100 percent of the low explosive limit (LEL) were detected in probe GP2S (north of the landfill), and in probes GP5S and GP5D (southeast of the landfill). On October 7, the probes were retested. Methane levels again exceeded 100 percent of the LEL at locations GP2S, GP5S, and GP5D. Figure 3 of the Landfill Gas Monitoring Plan shows the locations of the probes.

Contingency Plan Actions

In accordance with Landfill Gas Monitoring Plan Section 6.1.2, response actions are required due to the detected levels of methane in the gas probes. Response action that were taken or will be taken by the City or its consultants include:

Monitoring Actions

1) RMT conducted additional monitoring of the probes for approximately 2 weeks (October 6 through October 17). The monitoring showed consistent levels of methane in probes 2 and 5 above 100 percent of the LEL. At this point, the City does not plan to conduct weekly monitoring of the gas probes as specified in the Gas Monitoring Plan. The City acknowledges the presence of gas at the perimeter of the landfill at locations GP2 and GP5 in excess of 100 percent of the LEL. The City is currently investigating remediation options, and does not see a significant value in continued monitored at this point. Once remediation alternatives have been implemented, the City will resume monitoring to evaluate the effects of the remediation alternatives.

2) Several underground structures north of the landfill, along Ellsworth Road were monitored on October 7, 1997. No methane was detected.

RECEIVED
[illegible] 1997
DEQ-WMD JACKSON

3) Basements along both the north and southeast sides of the Landfill have been or will be monitored to verify that gas has not migrated to basements. On October 8, the basement at 4284 Platt Road was monitored (third house south of the landfill). Locations along the walls of the basement, in the breathing zone, and near the furnace were tested. At the locations along the wall and in the breathing space, no methane was detected. At locations near the furnace, very low levels (2 percent of LEL) of methane were detected. RMT believes that the detections are due to the furnace. On October 14, 1997 the basements of three residents in University Townhouses and Forest Squares Cooperative, north of GP2, were monitored. Locations along walls, in the breathing zone, and near the furnace were tested. No methane was detected.

   One additional basement north of the GP2 location will be monitored on October 30, 1997.

   The City is continuing efforts to contact the residents at 4240 and 4230 Platt. These are the first two houses directly south of the landfill. A letter was sent on October 14, 1997 from the City of Ann Arbor Engineering Division requesting access to the homes. The residents have not responded to the City's request. If no response is received by early November, the City Attorney will redraft a letter requesting permission to access the basements. The Pittsfield Township Supervisor will also be asked to write a letter requesting access to the basements. If these attempts fail, the City will evaluate other options to gain access to the basements or will consider additional sampling in the Railroad right-of-way (between the Landfill and the houses) to determine the extent of gas migration.

4) Insight, a consultant for the City, will conduct the next quarterly gas monitoring event in late October or early November. The sampling event will include four sanitary sewer manholes, one water main manhole, three monitor wells, six probe locations, one meter pit, and locations within buildings at the Landfill.

Remediation Actions

1) On the north side of the Landfill, gas ventilation stacks are being installed on four underground utility structures in late October or early November.

2) The City is working with Biomass to expand the current landfill gas extraction system at the Landfill. Biomass is reviewing their system and conducting tests to determine the extent that

the system can be expanded. The following is being evaluated:

- Phase I - North Side - Biomass indicated that there is a potential that 8 or 9 more wells can be installed on the north side of Phase II. There are four passive vents on the north side of the landfill. Two of the vents are currently capped and two are uncapped. Biomass indicated that there is pressure in the capped vents, and that the uncapped vents are releasing methane. Three of the four passive vents (and possibly all four) will be hooked up to the Biomass system with temporary connections. A vacuum will be pulled to determine if there is adequate gas volumes to expand the Biomass system. The temporary connections should be installed by the end of October. Biomass will conduct their testing in early November. The fourth passive vent is a significant distance from the Biomass system, therefore it may not be feasible to connect it to the system. If it is not connected, the vent will remain uncapped and allowed to vent.

- Phase I - Southwest Corner - Biomass indicated that there is a potential for more wells at this locations. Biomass will install test ports and sample two vents in this location. Results from the investigation should be available by mid November.

- Phase I - Southeast Corner - Biomass is considering this corner for expansion. Due to the shallow nature of the refuse, Biomass may not be able to install additional extraction wells at this location.

- Phase II - North Side - Biomass is considering the installation of extraction wells in the current locations of the passive vents at several locations along the north side of Phase II. Biomass needs to review the current plans to determine the feasibility. Biomass plans to completed with their review by early November.

The City is planning to meet with Biomass on November 7, 1997. At the meeting, Biomass should be able to convey most of their findings regarding the system expansion.

3) The City will evaluate the need for additional remediation activities after Biomass determines the extent of the expansion of the existing extraction system. The additional remediation activities to be considered by the City may include the installation of passive vents in locations not influenced by the Biomass system.

LANDFILL GAS MONITORING PROGRAM

PREPARED FOR:

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR
ENGINEERING DEPARTMENT
100 NORTH FIFTH AVENUE
ANN ARBOR, MICHIGAN 48107-8647

PREPARED BY:

RMT, INC., MICHIGAN
ANN ARBOR, MICHIGAN

October 1997

Jan C. Kucher

Jan C. Kucher, P.E.
Senior Project Engineer

Betty J. LeClerc

Betty LeClerc
Project Manager

RMT, Inc. — Ann Arbor, MI
1143 Highland Drive, Suite B - 48108-2237
PO Box 991 - 48106-0991
313/971-7080 ~ 313/971-9022 Fax

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Section 1
Introduction

1.1 Project Background

The City of Ann Arbor Landfill (Ann Arbor Landfill) is a closed Type II landfill, consisting of a total of 170 acres. The facility is divided into two phases, Phase I located on the east side of the site and Phase II on the west. A site location map and site plan are included as Figures 1 and 2, respectively.

Phase I is approximately 110 acres which was initially operated as a gravel pit and later accepted municipal and industrial waste. The City of Ann Arbor (City) purchased the site in the 1950's and operated the landfill until it was closed with a clay cover in 1984. The base of the western third of the Phase I area has a clay liner while the remaining two-thirds of Phase I is unlined.

The Phase II area is approximately 60 acres in size and was constructed as an engineered landfill, with four compacted clay lined cells and a leachate collection system. The Phase II landfill was operated from 1984 to 1992 and closed in 1992 using a composite clay and synthetic cap.

The Ann Arbor Landfill has an existing active landfill gas extraction system, which is operated by Biomass Energy Systems. The system consists of a series of extraction wells and a piping network which pulls landfill gas (LFG) out of the fill areas and directs it to an on-site flare. The system is currently operating in Phase II and the southwest portion of Phase I.

In order to prevent off site contaminant migration through the groundwater, the City constructed a slurry wall as part of a hydraulic barrier system. The slurry wall encloses the west, south and east boundaries of the facility as well as a portion of the north boundary of Phases I and II as shown on Figure 3.

1.2 Purpose and Scope

This document has been developed to describe a landfill gas monitoring program to assess the potential for off-site migration of landfill gases and to satisfy the requirements of the Michigan Department of Environmental Quality (MDEQ) Part 115, Act 451 requirements. Part 115, Rule 299.4433 requires that landfill owners and operators ensure that methane gas concentrations generated by the landfill do not exceed more than 25 percent of the lower explosive limit (LEL) in facility structures, and do not exceed the LEL at or beyond the property boundaries.

The LFG Monitoring Program proposed for the Ann Arbor Landfill includes the installation of monitoring probes located strategically around the perimeter of the facility, along with quarterly monitoring of on-site structures, public utility systems proximate to the site, monitoring probes and groundwater monitoring wells.

This Landfill Gas Monitoring Program supersedes and replaces the Draft of Landfill Gas Monitoring Plan, City of Ann Arbor Landfill, dated January 1997, which was previously submitted to the MDEQ.

Implementation of this program will commence immediately upon submittal to the MDEQ.

Section 2
General Safety Precautions

Health and safety aspects of LFG and leachate extraction systems are of primary importance during the operation, closure and post-closure periods of a landfill. Potentially explosive gases are generated as a by-product of the decomposition of the organic waste materials within the landfill.

LFG consists predominantly of a mixture of methane and carbon dioxide although small amounts of other gases are present. Methane is combustible in air at concentrations of 5 to 15 percent by volume. This range is defined as the lower explosive limit (LEL) and the upper explosive limit (UEL). These gases can migrate into confined spaces forming explosive and oxygen deficient areas. Additionally, volatile organic compounds (VOCs), which have carcinogenic components, can be released with LFG.

Because of this environment, activities such as drilling, trenching, and other construction-related work in the vicinity of the landfill should heighten safety concerns for those individuals working in the area. Additionally, when working in areas where the presence of LFG is suspected, intrinsically safe detection instrumentation should be used and smoking should be prohibited.

The health and safety section from a document prepared by the Landfill Gas Division of the Solid Waste Association of North America is presented as a reference in Appendix A.

Section 3

Landfill Gas Monitoring System

The Ann Arbor Landfill LFG monitoring system will include a series of monitoring probes, on-site structures, public utility manholes and groundwater monitoring wells. These select locations will be monitored as required, at a minimum on a quarterly basis. Monitoring locations are indicated on Figure 2, Site Plan and Landfill Gas Monitoring Locations, and Figure 3, Proposed Landfill Gas Monitoring Probe Locations.

3.1 Perimeter Monitoring Probes

Six pairs of gas monitoring probes are proposed to be installed around the perimeter of the landfill. Monitoring probe locations were selected based upon hydrogeological information specific to the site and locations of nearby structures. The locations of the perimeter gas probes are shown on Figure 3, and are designated as GP-1 through GP-6.

The monitoring probes will be constructed of 1-inch-diameter PVC pipe (Schedule 80) with 0.01-inch slotted well screens. The probes will be nested with two probes in each borehole, one screened in a shallow zone, the other screened in a deeper zone. The approximate depths of the monitoring probes are identified in Table 1. The two zones being monitored will be kept discreet by placing a bentonite plug in the borehole between the shallow probe screen and the deep probe screen. The borehole around the probes will be backfilled with a pea gravel filter pack and capped with a bentonite plug. All probes will be fitted with a laboratory stopcock sampling device located at the top of each probe, which will allow the withdrawal of a gas sample representative of the screened interval. The stopcock will also prevent gas from escaping when the probe is not being sampled. Figure 4 details the typical construction of gas monitoring probes around the perimeter of the landfill.

3.2 Building Monitoring

To verify that gases from the landfill are not migrating into the support buildings located at the site, monitoring points have been established in each of the support buildings. If methane is seeping into the building, an explosive environment could be created. By monitoring within the buildings at both the monitoring points and within the breathing space, a contingency plan can be enacted to mitigate the situation previous to a hazardous environment being generated.

Monitoring points are located within the buildings where landfill gases would most likely enter the structure, such as cracks in the foundation, floor drains, and utilities through the floor.

Monitoring points specific to the equipment maintenance building, recycling building and material recovery facility are identified on Figures 5, 6, and 7, respectively. In addition, the breathing space within the guard booth and fuel storage shed (both located near the recycling building) will be monitored.

3.3 Public Utility Structures

Public utility structures can contribute to LFG migration by providing both piped conduits (open joints in storm or sanitary sewers), or by providing gas transmission through void spaces in the stone bedding. Therefore, the monitoring of utility structures proximate to the landfill is essential.

As part of the quarterly monitoring program, two storm sewer manholes (R1 and R2), three sanitary sewer manholes (S1, S2, and S3), one water meter pit (MP) and two telephone/cable box (TB1 and TB2) will be monitored. The respective locations of these structures are identified on Figure 2.

3.4 Groundwater Monitoring Wells

Groundwater monitoring wells can be used to monitor subsurface soils for landfill gas constituents when a portion of the well screen is open above the static water level. Three downgradient groundwater monitoring wells (W-84-92, W-88-92 and W-85-92), will be monitored as part of the quarterly monitoring program.

Section 4
Equipment

4.1 Gas Monitoring Equipment

4.1.1 Landfill Gas Monitor

The monitoring instrument used during the quarterly monitoring events will, at a minimum, be capable of testing for three discreet parameters. There are a number of instrument manufacturers that can meet these requirements. The parameters, as well as the importance of each, are as follows:

- *Percent LEL* - The lower explosive limit or LEL of a vapor or gas is the lowest concentration that will produce a flash of fire when an ignition source is present. The LEL reading for the landfill gas sampling will be calibrated for methane because this is the primary gas of concern at a landfill site. The LEL for methane is 5 percent by volume. The explosive range is 5 to 15 percent by volume.
- *Percent Oxygen* - For some combustible gas meters, the presence of oxygen is required to properly measure the LEL. Therefore, with those meters, the validity of the LEL cannot be confirmed without knowing the oxygen concentration.
- *Percent Gas* - This is the percent by volume of a specific gas present within the total volume of the gas sample removed. The instrument will be calibrated to measure the percentage of methane present since this is the gas of primary concern. It will measure a total methane concentration with a different sensor when the percent LEL cannot be measured directly, due to insufficient oxygen.

If a landfill gas meter such as a Landtec GA-90 or GEM 500 with an infrared sensor is used for LFG monitoring, the percent by volume of CO_2 will also be recorded. The infrared gas sensor is not affected by the oxygen content of the gas.

4.1.2 Calibration

The calibration of the gas monitor is essential in obtaining accurate results during gas sampling. Calibration allows for fine-tuning the monitor to read the gas level for a specific gas. Prior to each monitoring event, the monitor will be calibrated for methane following the manufacturers recommended procedures. Documentation that the calibration has been completed will be placed in the field notes.

4.2 Gas Pressure Monitor

4.2.1 Requirements

In order to evaluate the potential for gas migration from the landfill, it is important to measure the pressure of the LFG in the gas probes and relate this to the ambient atmospheric pressure. Therefore, both probe pressure and barometric pressure are measured and evaluated.

Magnehelic pressure gauges with ranges of 0 to 0.25, and 0.50 to 2.0 inches of water column (w.c.) will be used to measure differential pressure at the gas probes. The appropriate gauge will be used for the probe pressures encountered. The Magnehelic gauges have positive and negative ports compatible for connecting tubing between the gauge and the gas probe stopcock (labcock) valve. Positive differential pressure in the gas probe pressure may indicate more favorable conditions for LFG to migrate out of the landfill.

4.2.2 Pressure Gauge Operation

Magnehelic pressure gauges are the size of a hand-held alarm clock and have a needle gauge that moves within a specified range, for example 0 to 0.25. Each gauge contains a diaphragm that is open to the atmosphere on one side. The lower scale gauges are sensitive to their own weight based on orientation and must be used upright, perpendicular to the ground, to avoid false readings.

The different gauge sizes are graduated based on the sensitivity to pressure. If the 0 to 0.25 gauge is used and the needle jumps past 0.25, the next gauge should be used and so on.

Each gauge contains a positive and a negative port. Positive pressure in a gas probe must be measured on the positive port on the pressure gauge and likewise for negative pressure on the negative port. Positive pressure indicates that the probe tends to release gas. A negative pressure indicates that the probe tends to draw in gas.

Field procedures for the use of the gas gauges are discussed in Subsection 5.1.

Section 5
Monitoring Procedures

5.1 Monitoring Procedures

The City of Ann Arbor Engineering Division will be notified of any monitoring activities, a minimum of 24 hours prior to the monitoring event.

Prior to each round of monitoring, proper operation and calibration of the monitoring equipment will be verified. Upon arriving at the site, the following general information will be recorded on the field log:

- Time of day
- Date
- Weather conditions
- Barometric pressure and trend
- Temperature
- Ground conditions (saturated, frozen, *etc.*)
- Names of monitoring personnel
- Calibration results

At each monitoring location, the following information will be recorded:

- Percent LEL as methane, or percent gas as methane
- Carbon dioxide (if an infrared meter is used, *i.e.*, GEM 500)
- Oxygen

In addition, gas pressure will be recorded for the perimeter monitoring probes. Typical field logs are included as Tables 2 and 3.

5.2 Perimeter Monitoring Probes

The locations of the perimeter monitoring probes are indicated on Figure 3. Each probe is protected with a locking cap on the top of the casing. This cap must be removed to access the sampling point location. As previously discussed, each of the gas probes has been fitted with a laboratory-type stopcock (labcock) valve. This is the sample point for the probes.

The gas pressure in the probe must be monitored prior to sampling the LFG. If the gas pressure is not measured first, the gas pressure will be increased or decreased as the gas is pulled through the instrument and the pressure will not be representative.

All probes will be visually inspected to insure the integrity of the probe. Any necessary repairs will be identified to the City and noted on the field log.

The following procedures shall be followed during gas probe monitoring:

5.2.1 Measuring the Gas Pressure

1. Unlock the cap on the protective casing to expose the labcock valve.
2. Prior to opening the labcock valve, connect flexible tubing between the stopcock valve and the positive port on the appropriate pressure gauge. Place the pressure gauge on a flat surface making sure the gauge is upright and the needle reads zero.
3. Open the labcock valve and observe the needle:
    - If the needle moves right within the gauge range, record the gauge reading on the data sheet.
    - If the needle moves left (less than zero), the pressure is negative. Close the labcock valve before moving the tubing from the positive port to the negative port on the pressure gauge. Reopen the labcock valve, and record the pressure as negative on the data sheet.
    - If the needle is out of range of the gauge, close the stopcock valve and connect the tubing to a pressure gauge with a higher range. Open the labcock valve and record the pressure.
4. Close the labcock valve.

5.2.2 Measuring the Gas Concentration

1. Confirm that gas pressure measurement has been recorded.
2. Calibrate the gas monitoring instrument in an area where ambient concentrations of gases of concern are not present. Use the instrument manufacturer's instructions.
3. Attach the monitoring instrument to the labcock valve and open the valve. Record the percent LEL, percent methane by volume, and percent oxygen. Allow to equilibrate for 30 to 60 seconds.

5.3 Building Monitoring

The specific location of monitoring points within each building are diagrammed on Figures 5 though 7. These monitoring points include cracks in the building floor or other penetrations through the building foundation where the gas may infiltrate as well as the breathing space (a height of approximately 4 to 6 feet) in the building. Additional breathing space monitoring will be conducted in the guard house and the fuel shed.

Building monitoring points may be modified as structure conditions warrant.

5.3.1 Measuring the Gas Concentrations

1. Run monitor continuously while inside buildings to monitor the breathing space.
2. Attach a short piece of flexible hose to the monitor.
3. Holding end of flexible tube immediately adjacent to the sampling location, allow monitor to equilibrate for 30 to 60 seconds.
4. Record highest percent LEL and lowest percent oxygen readings for each monitoring point.

A reading for gas pressure (other than atmospheric pressure) is not applicable within building locations because all monitoring points are at atmospheric pressure. Additionally, it is recommended that permanent monitors be installed in all site structures. Appendix B provides equipment options.

5.4 Public Utility Structures

If possible, measurements collected from the stormwater, sanitary sewers and water main manholes will be taken without removing the manhole cover (this can be done by inserting the tubing through an access hole) in order to determine actual conditions. If it is necessary to remove the manhole cover, the cover will be moved only enough to insert the monitoring probe and monitoring will occur immediately after the manhole cover is removed. Care must be taken to avoid contacting the tubing with water.

5.4.1 Measuring the Gas Concentrations

1. Attach an appropriate length of flexible tubing to the meter.
2. Lower the tubing into the manhole.
3. Turn monitor on and allow to equilibrate for 30 to 60 seconds.
4. Record the highest percent LEL and lowest percent oxygen.

Section 6
Contingency Plans

6.1 Contacts and Communications

In the event that methane concentration exceedances are detected at or above the LEL in off-site utilities or structures, or above 25 percent of the LEL in on-site facility structures, the City of Ann Arbor Engineering Department will contact the following agencies/companies by telephone:

Michigan Department of Environmental Quality	(517) 780-7900
City of Ann Arbor Department of Utilities	(313) 994-2666
Pittsfield Township Community Department	(313) 944-4440
Michigan Consolidated Gas	(800) 942-5571
Detroit Edison	(800) 477-4747
Ameritech	(313) 221-3131
MediaOne	(313) 973-2266

The City Engineering Department will also:

1. Immediately take all necessary steps to ensure protection of human health, as outlined in Sections 6.1.1 and 6.1.2, and notify the Director of the MDEQ.
2. Within 7 days of detection, place (in the operating record), the methane gas levels detected and a description of the steps taken to protect human health.
3. Within 60 days of detection, implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the Director that the plan has been implemented. The plan shall describe the nature and extent of the problem and the proposed remedy.

6.1.1 Buildings

Methane has an LEL of 5 percent by volume in air (% V/V). In the event that a reading of 10 percent of the LEL (0.5% V/V) or more is detected in a building, any occupants as well as the City of Ann Arbor Solid Waste Division and Engineering Division will immediately be notified. The building will be ventilated by opening windows and doors and using intrinsically safe fans. Continuous monitoring of gas levels will occur as ventilation procedures are enacted. As the methane concentration subsides, the City Engineering Department or its consultant will attempt to determine the source of the methane migration into the building and seal it as soon as possible. The building will then be monitored on a daily basis for a minimum of two weeks. All monitoring will be documented and placed in the operating record. Further measures will be evaluated to eliminate the source of migrating methane.

In the event that a reading of 25 percent of the LEL is detected (methane of at least 1.25% V/V) in the breathing space, the building will be evacuated and ventilated. The monitoring personnel will notify the City Solid Waste Division and Engineering Division and should contact the local fire department immediately. The location of the methane pathway will be investigated by installing additional gas probes outside the buildings. Once the pathway has been located, the City Engineering Department or its consultant will evaluate a remedial activity to mitigate migrating methane. Until remedial systems are installed, methane monitoring will occur at least daily inside the buildings. Monitoring inside the buildings will then occur daily for 2 weeks. Methane monitoring will also occur outside the buildings at the newly installed probes, at least once a day, for the same period as the inside monitoring. The newly installed probes will then be sampled at the same frequency as the other exterior probes around the perimeter of the landfill.

6.1.2 Utility Structures, Groundwater Monitoring Wells, and Gas Probes

If methane (measured as a percentage of the LEL) is detected in any of the utility structures, groundwater monitoring wells, or gas probes outside the limits of waste above background levels, but below 25 percent of the LEL, then the following actions will be taken by the City Engineering Department or its consultant:

- Landfill gas extraction system components will be inspected within 5 working days to ensure that they are working properly. As necessary, repairs will be made as soon as practical (depending on the problem).
- As appropriate, the valve settings at the individual wellheads will be adjusted to rebalance the system. If needed, this adjustment will be made within 5 working days.
- Weekly monitoring will be conducted at the affected probe(s) as well as at probes near the affected probe(s), until the methane level in the affected probe(s) returns to background.

See Addendum #

If methane is detected in any of the utility structures, groundwater monitoring wells, or gas probes at or above 25 percent of the LEL, then the following actions, in addition to those listed above, will be taken:

- A barhole investigation will be conducted if possible to determine the extent of subsurface gas migration. Additional permanent gas monitoring probes may also be installed.

- A landfill gas control plan, describing a comprehensive set of response actions that will be taken if methane concentrations increase above 100 percent of the LEL, will be prepared and submitted to the MDEQ for review and comment.

If methane is detected in utility structures, groundwater monitoring wells, or gas probes at or above 100 percent of the LEL, appropriate mitigating actions will be taken as soon as practical. These actions may include, but are not limited to, the following:

- Performance of additional investigations to define scope and assess available technologies.
- Installation of additional gas extraction wells
- Installation of additional blower capacity
- Performance of a survey (using a hand-held instrument) of potential points of subsurface gas entry into occupied structures near the affected probe(s)
- Installation of a passive gas barrier trench
- Installation of continuous gas monitors in occupied structures not already equipped

See Addendum #1

Prior to undertaking any activity that will disturb the final cover system over the landfill, a written plan will be prepared and submitted to the MDEQ for review and comment.

Section 7

Gas Sampling and Reporting

The sampling frequency and the reporting frequency for the sampling areas (perimeter gas probes, groundwater monitoring wells, utilities, and building monitoring locations) will be quarterly for 2 years beginning with July 1997. Gas probe monitoring will continue on this schedule and will then be reassessed based on the results of the sampling.

All monitoring information shall be recorded on the Gas Monitoring Data Sheet (Table 3), and shall be completed as monitoring occurs. Copies of the field data sheets will be included in the quarterly report, as well as a tabulation of historical monitoring results.

Reports will be sent to the MDEQ in a letter format on a quarterly basis. If sampling intervals for the different monitoring areas overlap, then those results can be grouped into the same letter.

Section 8
Gas Monitoring Probe Maintenance

Maintenance will be performed as necessary in response to conditions identified by regular inspections. Gas monitoring probes will be replaced as needed. A summary of anticipated gas probe maintenance follows:

1. *Protective Casing and Surface Seal*

   The probe's labcock valve may deteriorate and require replacement. No solvents, solvent weld glue, silicon caulk, or silicon-based compounds shall be used for any maintenance on the gas probe cap, stick-up, or casing. Such substances can damage internal elements on gas monitoring instruments. The threaded cap shall be airtight but also removable. Teflon® tape may be used if necessary to obtain an airtight fit with the PVC cap.

2. *Well Identification*

   If well identification labels become illegible, they will be refurbished or replaced.

3. *Accessibility*

   Excessive vegetative overgrowth can conceal probes making them difficult to locate and can be a nuisance when sampling. Such vegetation will be cut or uprooted; herbicides will NOT be used. Any other site conditions that may prevent or impair access to well locations should be addressed as appropriate.

4. *Sampling Capability (well integrity)*

   Gas probes may become inoperable if they become watered out by an increase in the water table or an accumulation of water in the borehole. An indication of a probe becoming watered out is when the sampling instrument draws a vacuum on the probe. If this occurs, the probe cap should be removed and the water level should be checked in the probe. If the entire well screen is submerged, the gas probe should be replaced unless an evaluation indicates that the water level observed is due to a temporary local phenomenon or due to seasonal water table fluctuation.

Section 9
References

Earth Tech, Inc. May 1997. Draft Landfill Gas Monitoring Plan for the City of Ann Arbor Landfill.

Landfill Gas Division of the Solid Waste Association of North America (SWANA). 1992. A compilation of landfill gas field practices and procedures. pp. I:1 - I:30. Publication #GR-LG 0101.

Table 1
Proposed Gas Monitoring Probes
City of Ann Arbor Landfill
Ann Arbor, Michigan

PROBE NUMBER	APPROX. GROUND ELEVATION	APPROX. WATER ELEVATION	DEPTH/ SHALLOW PROBE	SHALLOW SCREEN INTERVAL	DEPTH/ DEEP PROBE	DEEP SCREEN INTERVAL
GP-1	836.5	813	830	5′	818	5′
GP-2	848.0	814	833	5′	819	5′
GP-3	846.5	817	835	5′	820	5′
GP-4	830.0	815	826	3′	820	5′
GP-5	852.0	815	837	5′	820	5′
GP-6	836.0	814	831	5′	819	5′

Notes:

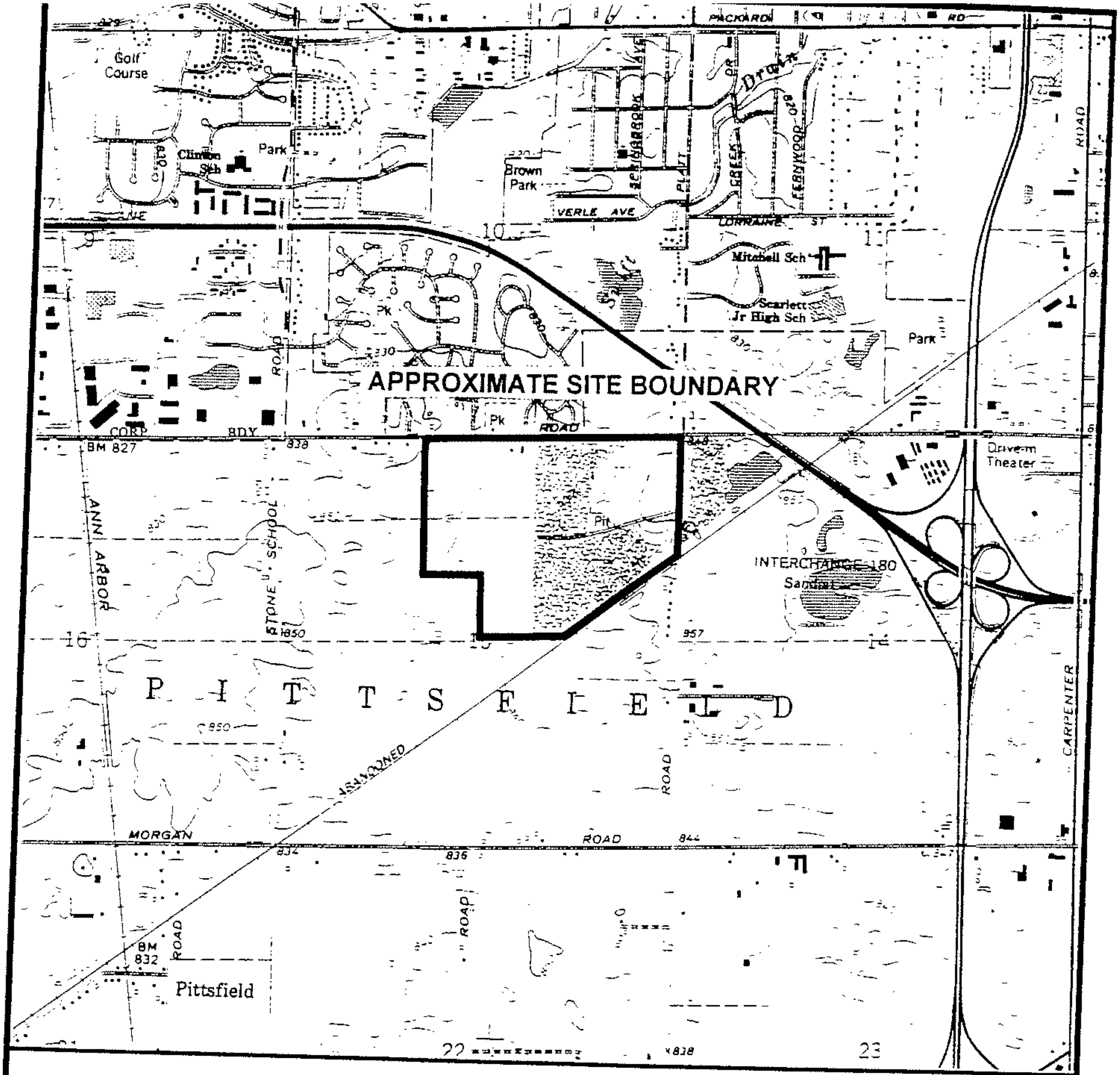
1. Screen is to be field placed in granular strata.
2. Probes to be labeled shallow and deep.
3. Probe top and bottom elevations to be shot.

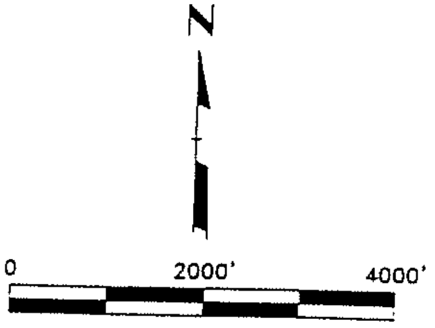
Table 2
Landfill Gas Monitoring
City of Ann Arbor Landfill

LOCATION	DESCRIPTION	PERCENT METHANE	PERCENT METHANE OF LOWER EXPLOSIVE LIMIT
Maintenance Building	Mon Pt. 1		
	Mon Pt. 2		
	Mon Pt. 3		
	Mon Pt. 4		
	Mon Pt. 5		
Fuel Shed	Mon Pt. 6		
Recycling Drop Drop-Off Building	Mon Pt. 7		
	Mon Pt. 8		
	Mon Pt. 9		
Guard House	Mon Pt. 10		
MRF	Mon Pt. 11		
	Mon Pt. 12		
	Mon Pt. 13		
Sanitary Sewer	S#1		
	S#2		
	S#3		
Storm Sewer	R#1		
	R#2		
Water Meter Pit	MP		
Groundwater Monitoring Wells	W-84-92		
	W-88-92		
	W-85-92		

Table 3
Gas Monitoring Data
City of Ann Arbor Landfill

GAS PROBE/ STRUCTURE		PARAMETER	Date: By: Temp: ATM Pres.: Inst. Cal.: Weather: Ground Conditions:	Date: By: Temp: ATM Pres.: Inst. Cal.: Weather: Ground Conditions:	Date: By: Temp: ATM Pres.: Inst. Cal.: Weather: Ground Conditions:	Date: By: Temp: ATM Pres.: Inst. Cal.: Weather: Ground Conditions:
	Shallow (high)	Probe Pressure (in. WC)				
		CH4 (%)				
		CH4 (% LEL)				
		CO2 (%)				
		O2 (%)				
		Comments:				
	Deep (low)	Probe Pressure (in. WC)				
		CH4 (%)				
		CH4 (% LEL)				
		CO2 (%)				
		O2 (%)				
		Comments:				
	Shallow (high)	Probe Pressure (in. WC)				
		CH4 (%)				
		CH4 (% LEL)				
		CO2 (%)				
		O2 (%)				
		Comments:				
	Deep (low)	Probe Pressure (in. WC)				
		CH4 (%)				
		CH4 (% LEL)				
		CO2 (%)				
		O2 (%)				
		Comments:				





SOURCE:

BASE MAP DEVELOPED FROM THE YPSILANTI WEST, MICHIGAN 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP, DATED 1967, PHOTOREVISED 1983.

FIGURE 1

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR ENGINEERING DEPARTMENT
ANN ARBOR, MICHIGAN

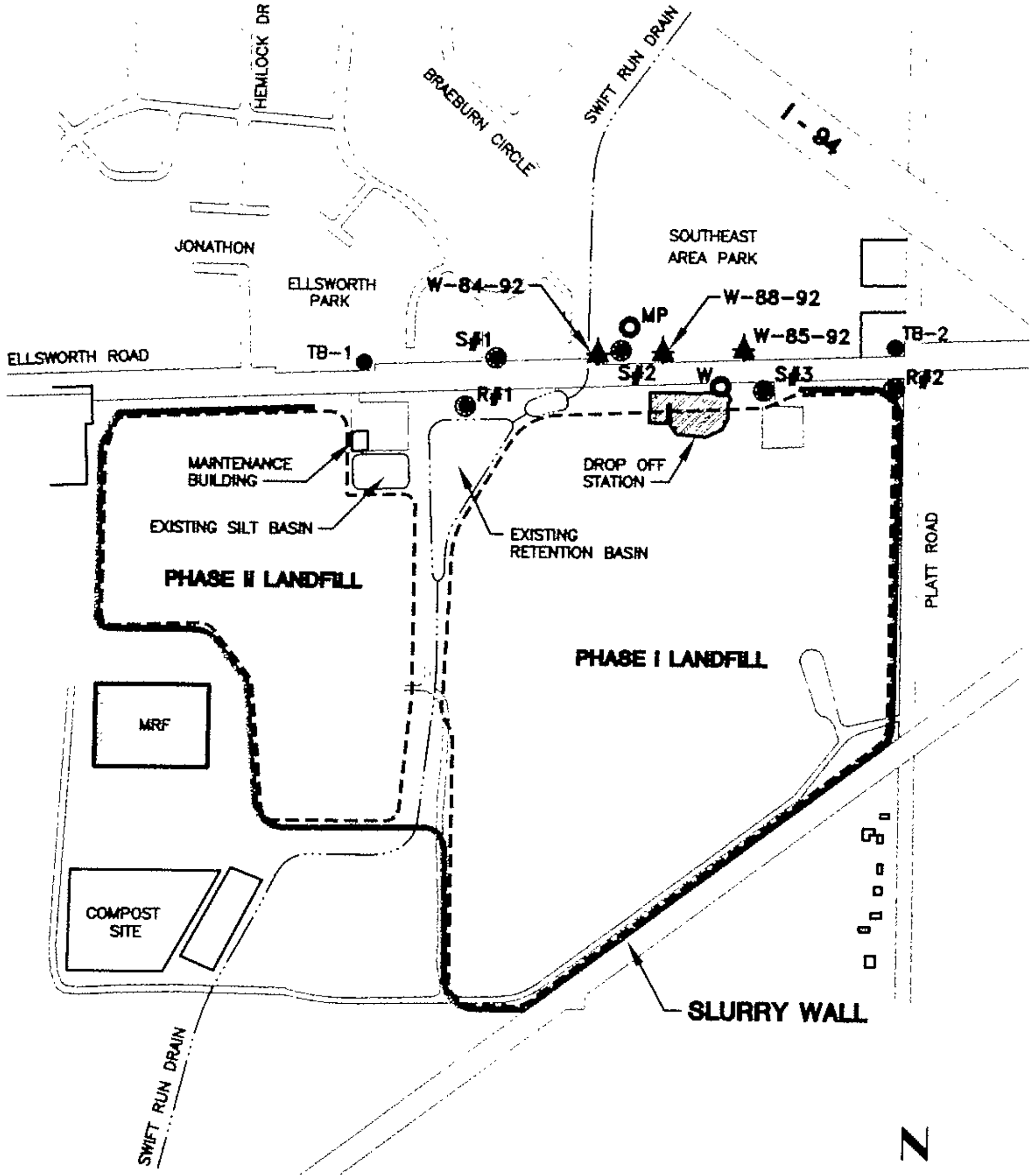
SITE LOCATION MAP

DRAWN BY:	SJL	PROJ. NO.	4054.02
CHECKED BY:	JTB	FILE NO.	40540200
APPROVED BY:		DATE:	AUGUST 1997

RMT INC.

1143 HIGHLAND DRIVE, SUITE B
ANN ARBOR, MI 48108-2237

P.O. BOX 99' 48106-0991
PHONE: 313-971-7080



LEGEND

W ○	WATER MAIN MANHOLE LOCATION
MP ○	METER PIT MANHOLE LOCATION
S#1 ●	SANITARY SEWER MANHOLE LOCATION AND NUMBER
R#1 ●	STORM SEWER MANHOLE LOCATION AND NUMBER
W-84-92 ▲	GROUNDWATER MONITOR WELL LOCATION AND NUMBER
TB-1 ●	TEST BORING LOCATION AND NUMBER

NOT TO SCALE

FIGURE 2

CITY OF ANN ARBOR LANDFILL CITY OF ANN ARBOR ENGINEERING DEPARTMENT ANN ARBOR, MICHIGAN	DRAWN BY: SJL CHECKED BY: JTB APPROVED BY:	PROJ. NO. 4054.02 FILE NO. 40540207 DATE: OCTOBER 1997
SITE PLAN AND LANDFILL GAS MONITORING LOCATIONS	RMT INC.	1143 HIGHLAND DRIVE, SUITE B ANN ARBOR, MI 48108-2237 P.O. BOX 991 48106-0991 PHONE: 313-971-7080

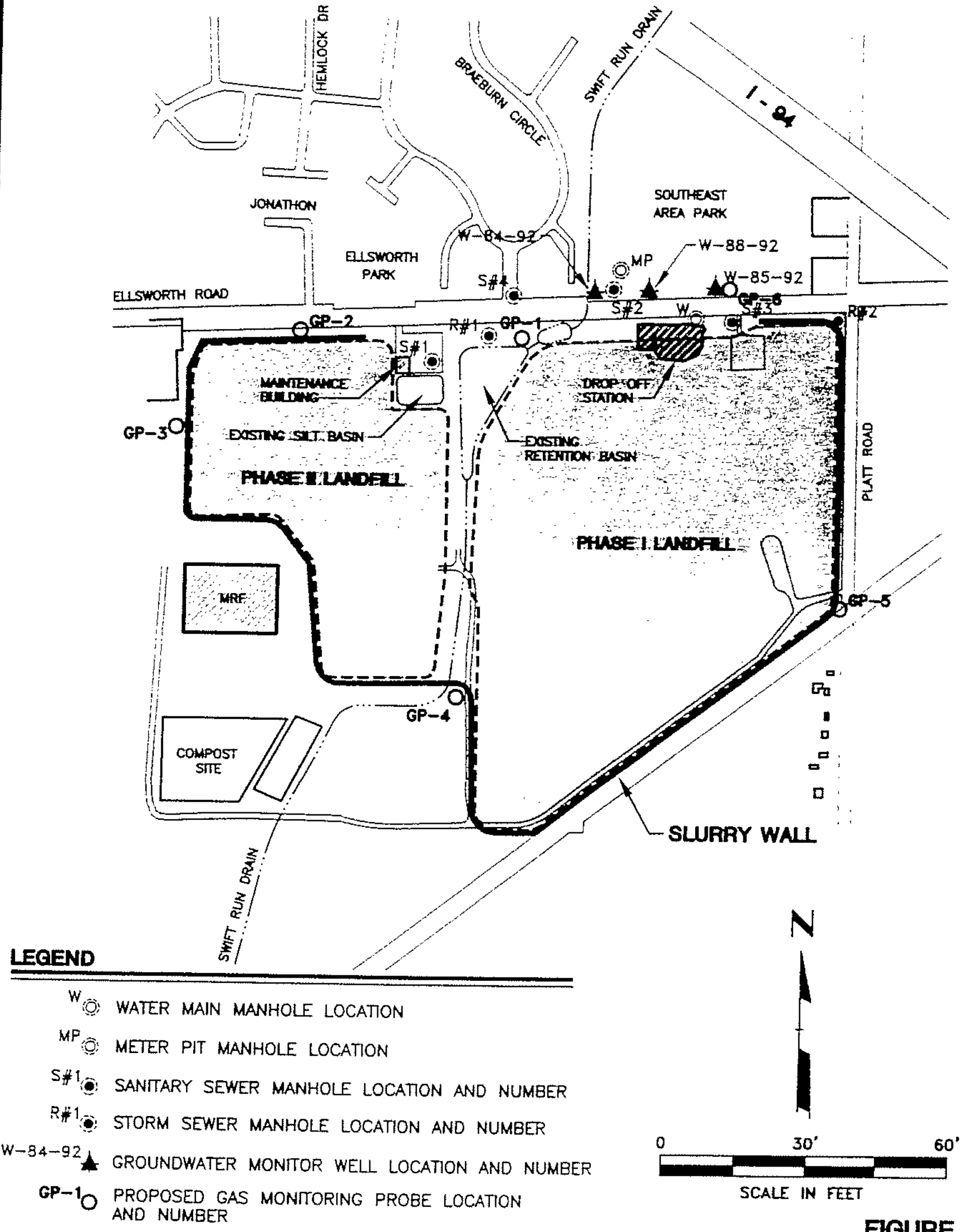


FIGURE 3

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR ENGINEERING DEPARTMENT
ANN ARBOR, MICHIGAN

DRAWN BY:	SJL	PROJ. NO.	4054.02
CHECKED BY:	JTB	FILE NO.	40540208
APPROVED BY:		DATE:	AUGUST 1997

PROPOSED LANDFILL GAS MONITORING PROBE LOCATIONS

RMT INC.

1143 HIGHLAND DRIVE, SUITE B
ANN ARBOR, MI 48108-2237

P.O. BOX 991 48106-0991
PHONE: 313-971-7080

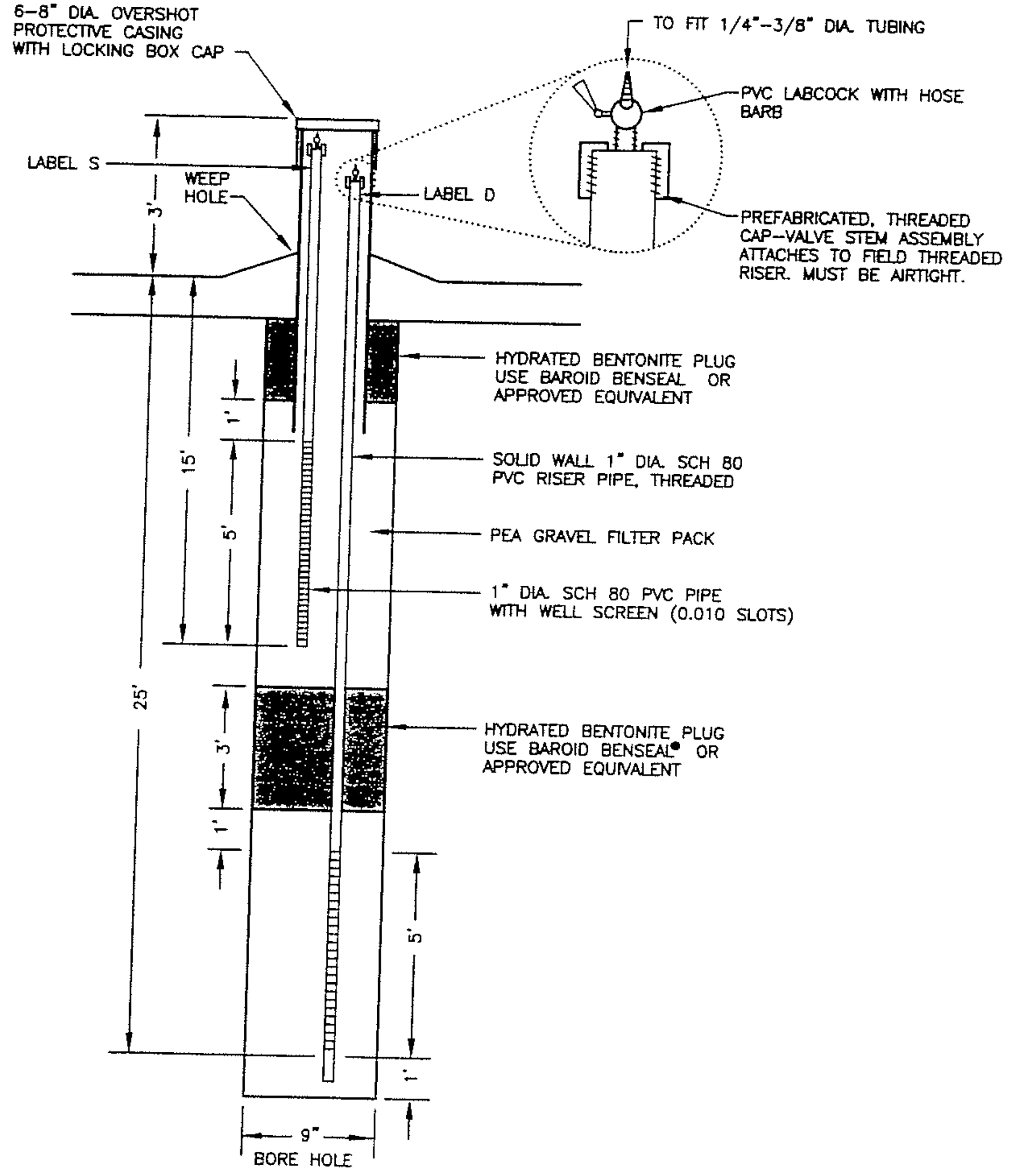


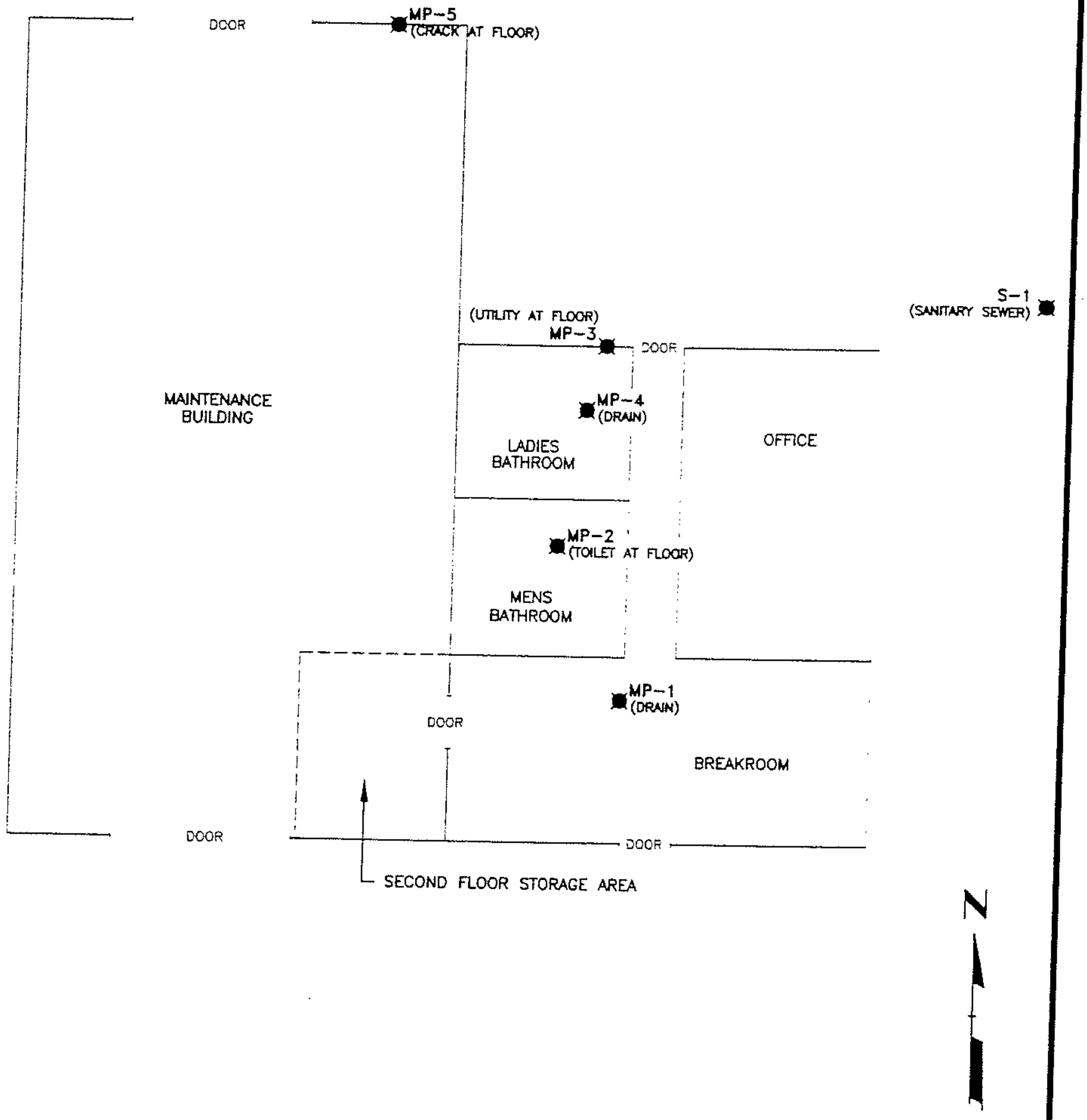
FIGURE 4

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR ENGINEERING DEPARTMENT
ANN ARBOR, MICHIGAN

DRAWN BY:	SJL	PROJ. NO.	4054.02
CHECKED BY:	JTB	FILE NO.	40540205
APPROVED BY:		DATE:	AUGUST 1997

TYPICAL GAS MONITORING PROBE DETAIL

RMT INC.
1143 HIGHLAND DRIVE, SUITE B
ANN ARBOR, MI 48108–2237
P.O. BOX 991 48106–0991
PHONE: 313–971–7080



NOT TO SCALE - "SKETCH DRAWING"

FIGURE 5

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR ENGINEERING DEPARTMENT
ANN ARBOR, MICHIGAN

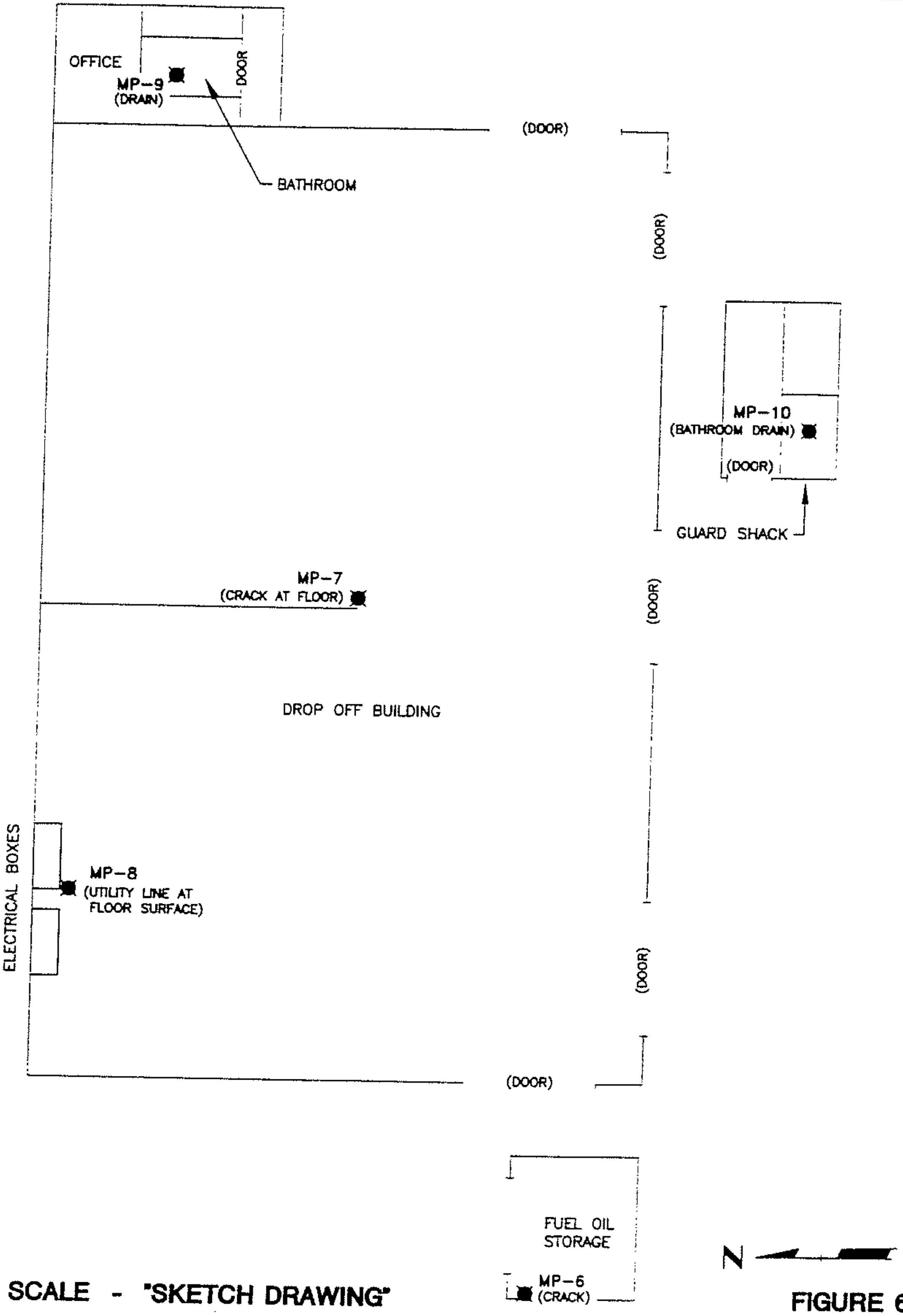
GAS MONITORING LOCATIONS
MAINTENANCE BUILDING

DRAWN BY:	SJL	PROJ. NO.	4054.02
CHECKED BY:	JTB	FILE NO.	40540201
APPROVED BY:		DATE:	AUGUST 1997

RMT INC.

1143 HIGHLAND DRIVE, SUITE B
ANN ARBOR, MI 48108-2237

P.O. BOX 991 48106-0991
PHONE: 313-971-7080



NOT TO SCALE - "SKETCH DRAWING"

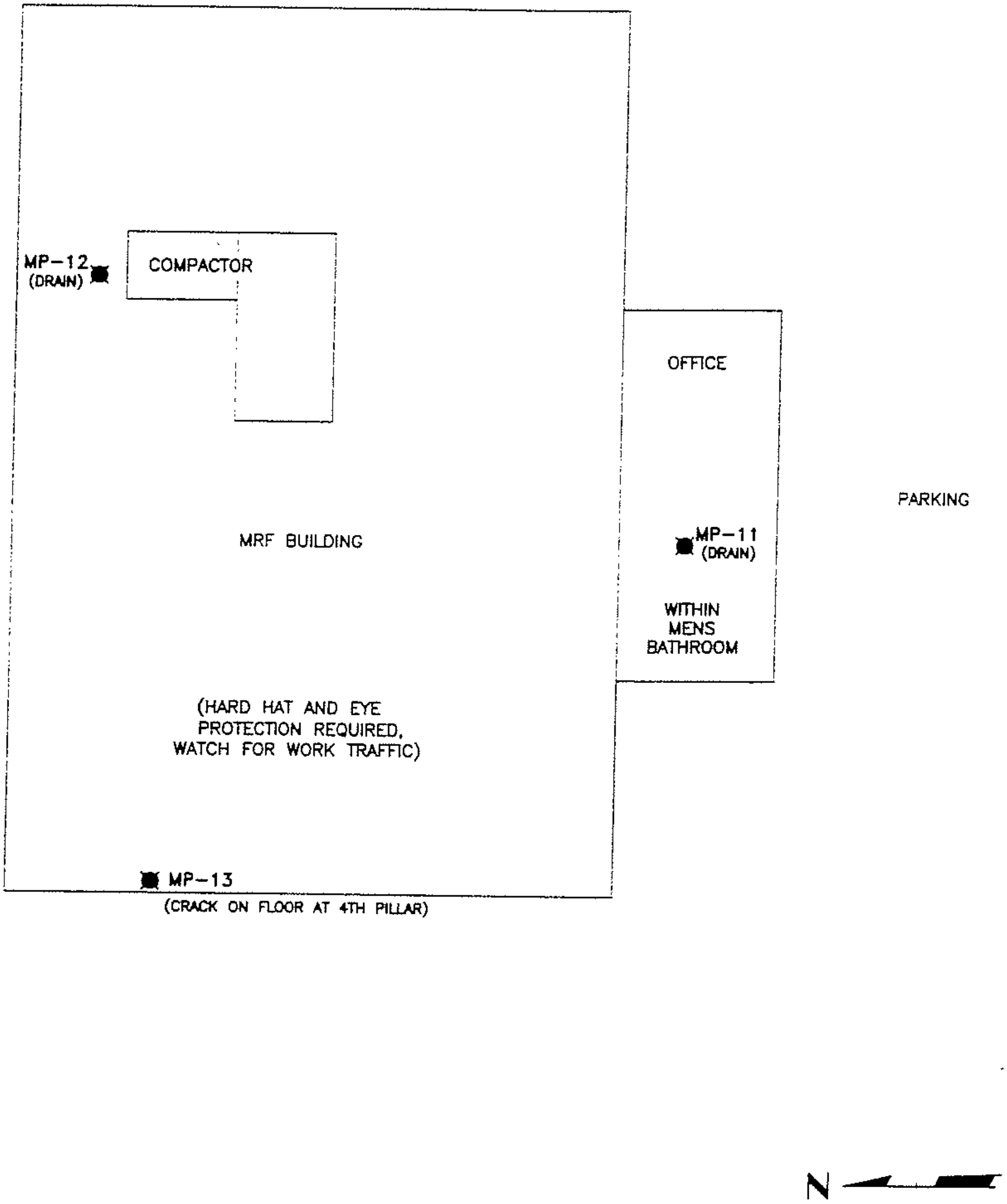
FIGURE 6

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR ENGINEERING DEPARTMENT
ANN ARBOR, MICHIGAN

DRAWN BY:	SJL	PROJ. NO.	4054.02
CHECKED BY:	JTB	FILE NO.	40540202
APPROVED BY:		DATE:	AUGUST 1997

GAS MONITORING LOCATIONS
DROP OFF BUILDING

RMT INC.
1143 HIGHLAND DRIVE, SUITE B
ANN ARBOR, MI 48108-2237
P.O. BOX 991 48106-0991
PHONE: 313-971-7080



NOT TO SCALE - "SKETCH DRAWING"

FIGURE 7

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR ENGINEERING DEPARTMENT
ANN ARBOR, MICHIGAN

DRAWN BY:	SJL	PROJ. NO.	4054.02
CHECKED BY:	JTB	FILE NO.	40540203
APPROVED BY:		DATE:	AUGUST 1997

GAS MONITORING LOCATIONS
MRF BUILDING

RMT INC.

1143 HIGHLAND DRIVE, SUITE B
ANN ARBOR, MI 48108-2237

P.O. BOX 991 48106-0991
PHONE: 313-971-7080

Appendix A
Health and Safety Section by the Landfill Gas Division of the Solid Waste Association of North America

A COMPILATION OF LANDFILL GAS LABORATORY AND FIELD PRACTICES AND PROCEDURES

HEALTH AND SAFETY SECTION

PREPARED BY:

SWANA LANDFILL GAS DIVISION
HEALTH & SAFETY TASK FORCE

August 1991

1:SWANAH&S.FRM

Acknowledgment

The following persons are acknowledged as active participants on the Health and Safety Task Force. Their participation and commentary in revision of this document is greatly appreciated.

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Mr. George L. Coiner
Mr. Steven P. Cooper
Mr. Douglas W. Coordes, C.I.H
Ms. Lenda Doane
Mr. Michael D. Geyer, P.E.
Mr. Clyde N. Moore, P.E.
Mr. Richard W. Prosser, P.E.
Mr. Jon Shields
Mr. Anton Svorinich
Mr. Michael E.W. Ward
Mr. Mark A. Weisner
Mr. Jim Wheeler (Chairman)

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Page

TEXT

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(continued)

TABLES

HEALTH AND SAFETY SECTION

A. PURPOSE AND GENERAL INTRODUCTION

The purpose of this section is to provide information on health and safety practices for use in working with landfill gas (LFG) at municipal solid waste (MSW) landfills. This document is based on a consensus of practices developed based on specific experience with LFG. This document is not intended to apply to hazardous waste sites, however certain special circumstances which may be encountered at MSW landfills are addressed.

The Occupational Safety and Health Act (OSHA) of 1970 requires employers to furnish a place of employment which is free of recognized hazards that cause or are likely to cause death or serious physical harm to employees. Employers have the obligation to eliminate recognized hazards, to comply with safety and health standards, and to provide the necessary information and training to the employee.

Landfill safety requires more than the common sense safety procedures common to all industries. Bacterial decomposition of trash results in the formation of methane, a colorless, odorless, potentially explosive gas that together with other volatile materials is emitted into the atmosphere and migrates through the soil into surrounding areas. Air quality studies consistently show that concentrations of most potentially hazardous substances in the ambient air on and in the vicinity of solid waste landfills are well below threshold limits. Threshold limits are those limits above which chemical substances may cause harm. Various standards for threshold limits are discussed later in this text. However, in the presence of confined or enclosed areas and venting sources of gas on or adjacent to landfills, dangerous concentrations of combustible and possibly toxic gases may accumulate. LFG is chiefly composed of four common gases: methane, carbon dioxide, nitrogen and oxygen. The first three are simple asphyxiants; hence, oxygen depletion may also occur in these areas of confinement. Therefore, safety procedures should be followed at all times (e.g., monitoring for adequate levels of oxygen and for explosivity in vaults or excavations, etc.).

When conducting certain special activities such as drilling and trenching in refuse, or entering confined spaces such as vaults and excavations, toxic and odorous gases can be present. Odorous gases cause nausea in some persons. Toxic gases may also be present at concentrations above or below the levels deemed safe for human exposure; there is always a potential for levels to be sufficient to cause permanent and irreversible damage and even death. Monitoring of site conditions during these special activities is therefore recommended even where not specifically required by law.

Work activities which place employees in direct contact with LFG will most likely require the use of respiratory protection equipment. This is often advisable as a precautionary measure, even if regulatory action levels have not been exceeded. Such a policy demonstrates prudence by limiting exposure. The law requires that when working with carcinogens all possible exposure must be limited to the maximum extent feasible.

Where appropriate, Federal OSHA and other regulations have been cited to assist the reader in locating specific information on standards and requirements. More stringent local standards have been cited as examples where Federal OSHA guidance is lacking.

B. PLANNING

Employees are required to comply with safety rules and regulations applicable to their activities and conduct. Personnel must be physically able and mentally willing to comply with safety requirements. Managers should organize and plan for both the most likely and least likely contingencies. Planning should include the following:

1. Designate responsibility outlined as follows:

    a. Principal in charge. (Engineering company principal, Public Works Director, etc.)

    b. Technical/Project Director. (Project Principal/Associate/Director, etc.)

    c. Safety Officer/Manager (office). (Project Manager/Company Safety Manager, Landfill Operations Manager, etc.)

    d. Site Safety Coordinator (field). (Project Engineer, LF Operations Supervisor, etc.)

2. Physical health examination reports, certified by a qualified occupational health physician, should state that the worker is fit to wear the personal protective equipment required.

3. Identify the nearest hospital and emergency notification phone numbers.

4. Prepare admissions information before time of need for each employee, as appropriate.

The following admissions information is often required:

a. Name, address, telephone.

b. Next of kin - relationship, telephone, spouse (patient's).

c. Social Security Number, date of birth, age.

d. Employer - address, telephone.

e. Responsible party - Social Security Number.

f. Insurance company - name, address, telephone, policy holder, policy number.

g. Personal medical data - tetanus history, general history, present medications, personal physician.

h. Allergic reactions or allergies.

C. SAFETY PLANS AND PROGRAMS

It is common for a company or a work location such as a landfill to have a general health and safety plan or program. General health and safety program components should address the following as necessary/appropriate depending on conditions and state and local laws:

1. Accident Prevention Program (General Safety).
2. Hazard Communication and "Right-to-Know".
3. Noise Control.
4. Dust Control.
5. Respiratory Protection Program.
6. Medical Surveillance (mandatory under certain circumstance, optional in others).
7. Safety training program (including hazardous materials and hazardous waste site training).
8. Personnel and Work Environment Monitoring.
9. Records Maintenance (all of the above).

1. Accident Prevention Program

A written accident prevention program covering general safety issues is the first basic building block of an overall health and safety program. The program should cover company policy, objectives of the program, and assignments of responsibility for the health and safety function. Availability of resources should also be addressed.

Employee training sessions and routine "tailgate" safety meetings are advisable and in some instances required.

2. Hazard Communication and "Right-to-Know" Standards

Typically, requirements for hazard communication and "right-to-know" programs do not apply to waste sites. However, future incorporation of such programs may be mandatory or at least in the best interest of the landfill owner/operator, LFG developer, or consultant. Such programs provide a good start for properly informing personnel of the hazards to which they may be exposed. These programs are necessary in any event if such hazards are known or suspected to exist. The Hazard Communication Standard does apply to construction, and recovery system operation and maintenance activities. The Federal Hazard Communication Standard is covered in 29 CFR Part 1910.1200.

For example, if personnel perform such tasks as constructing or repairing and maintaining PVC LFG collection systems, and therefore work with PVC cement and primer, then the personnel who work with those materials are covered under requirements of Hazard Communication and "Right-to-Know" statutes. Material Safety Data Sheets (MSDSs) must be maintained, and personnel must be trained in their understanding and use. MSDSs may also be required at LFG recovery plants where water treatment or other types of chemicals are used. Information on constituents found in LFG (vinyl chloride, methylene chloride, benzene, or toluene, for example) could be included in such a program, if concentrations are significant. It may be impractical to attempt to identify all chemicals; only those chemicals of special significance or when found in a high enough concentration in raw LFG to be of concern should be addressed in detail, however. For municipal sites, such an approach may not be mandatory, but may be prudent both from a common sense standpoint as well as from a liability perspective.

3. Noise Control

Where high levels of noise may be present for prolonged periods, a noise control program is typically required. Appropriate use of hearing protection, (e.g., ear plugs, ear muffs, etc.,) should be enforced. The Noise Control Standard is covered in 29 CFR Part 1910.95.

4. Dust Control

Typical dust control mitigation practices require the regular use of a water truck. Where high levels of dust and particulates may be generated from excavation, drilling or earth moving operations, a dust control program, sometimes including fugitive dust monitoring and sampling, is typically required.

5. Respiratory Protection Program

A written respiratory protection program is a legal requirement where it is necessary to employ the use of respiratory protection equipment. Requirements for a minimal acceptable program can be found at 29 CFR 1910.134 (b). The elements of a good program are:

1. Use of engineering controls wherever possible.
2. Hazard identification and assessment.
3. Written standard operating procedures.
4. Employee training.
5. Periodic medical assessment of employees and approval for respirator fitting and use.
6. Appropriate respirator selection for a specific job.
7. Proper qualitative fitting of respirators to personnel.
8. Maintenance and storage of respiratory protection equipment.
9. Periodic reevaluation of the program.

Persons involved in the administration of a program should be thoroughly familiar with such concepts as the protection factor (PF) of the air purifying respirators (APRs) used, the Maximum Use Concentration (MUC) of the APRs, determination of the Maximum Use Limitation (MUL) of a respirator, Permissible Exposure Limits (PELs), Threshold Limit Values (TLVs), and the levels Immediately Dangerous to Life and Health (IDLHs), as well as other concepts such as warning properties and respirator filter breakthrough.

Specific regulatory requirements for respiratory protection are delineated in CFR 29, Part 1910.134, for general industry and 29 CFR 1926.103 for the construction industry. Federal OSHA PELs are found in 29 CFR 1910.1000 Subpart Z. The PELs are legal standards. Note, that many states publish their own PELs and often adopt the American Conference of Governmental Industrial Hygienists (ACGIH) TLVs. Additional guidance may be found in the current annual edition of "Threshold Limit Values and Biological Exposure Indices" published by the ACGIH. This document contains the often cited Threshold Limit Value/Time-Weighted-Average (TLV-TWA), Threshold Limit Value/Short-Term Exposure Limit (TLV-STEL) and Ceiling (C) exposure limits. Also providing relevant guidance are the National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limits (RELs) found in "NIOSH Pocket Guide to Chemical Hazards" (1990) available from the U.S. Government Printing Office. Note that there are some differences between these standards. TLVs are not intended to be applied by untrained persons.

Engineering Controls

It is a basic tenet of respiratory protection that an employer must first employ whatever engineering controls are available to reduce the hazard. If, after instituting such controls, conditions still warrant the use of respiratory protection, then such use must be implemented. An example of an engineering control would be an exhaust hood to control venting vapors while drilling.

Medical Assessment for Respirator Use

Prior to distribution of respirators to individuals and their fit testing, individuals must see a qualified physician to undergo an occupational physical assessment for proposed respirator use. This is a strict legal requirement. A physician who is Board-certified in Occupational Health is recommended. There are numerous medical issues which must be addressed by a qualified medical professional, such as diabetes, cardiovascular problems, and the like, which are not readily apparent to the untrained individual.

Respirator Fit Testing

As previously stated, respirator fit testing is performed only after approval by a qualified physician. Fit testing is intended to verify the fit of a particular brand of respirator to a specific individual, demonstrate effectiveness and instill confidence in respiratory performance, and allow the tested individual to determine and experience the physical limitations of respirator use.

6. Medical Surveillance

In addition to medical approval and surveillance for use of respiratory protection equipment, baseline physicals and medical surveillance may be required for certain work under special circumstances. If exposure to concentrations of toxic chemicals, such as benzene, vinyl chloride, and asbestos for example, is above action levels, then medical surveillance is warranted; otherwise, it probably is not. Constructor, consultant and LFG developer staff who routinely work directly with LFG at municipal landfills, as well as with other issues such as at hazardous waste sites, would fall into this category; most others would not. 29 CFR Part 1910.20 governs access to employee exposure medical records.

7. Safety Training Program

A basic safety training program, is usually provided to serve the following functions:

1. Teach and inform employees about basic safety concerns.
2. Address job-specific hazards likely to be encountered.
3. Fulfill certain legal notification and training requirements.
4. Heighten employee awareness.

8. Personnel and Work Environment Monitoring

Consistent with any applicable "general health and safety clause," an employer must monitor employees and/or the work environment whenever a risk for employee exposure is known or can be suspected. Requirements for personnel or work environment monitoring are dependent on the type of work being performed and specific site conditions. Therefore, monitoring may or may not be appropriate, depending on the situation and whether or not specifically required by federal, state, or local regulations. The employer will determine when, and at what frequency, such monitoring should be performed.

Typically in industrial processes, the contaminants or substances which may cause a health threat are known and monitoring is straightforward. For certain specific substances of great concern, action levels, at and above which monitoring must take place, are specified by regulation (e.g., the action level for vinyl chloride is 0.5 parts-per-million or ppm). The action level for a given substance is typically set at one-half of the TLV or OSHA PEL, but may be specified otherwise by regulation. When it is necessary to monitor work on waste sites, more complex issues are encountered. A thorough site characterization is necessary at the outset of site work for the safety of personnel who will engage in field monitoring, construction, engineering, or LFG recovery activities. The monitoring or sampling plan may need to be modified or adjusted based on findings.

Monitoring or sampling techniques could involve the use of a combustible gas analyzer (CGA) or an organic vapor analyzer-flame ionization detector (OVA-FID) to monitor total raw gas concentration in air and estimate the percentage of trace contaminants based on analytical data. Alternately, continuous use of more sophisticated personnel or area sampling could be required. Any monitoring or sampling plan should be able to demonstrate an approach with a justifiable rationale, and should be scrutinized for statistical validity. The necessity for such monitoring or additional sampling should be determined by an experienced and qualified professional based on the types of hazards and risks present and the extent of exposure for the work to be performed.

9. Records Maintenance

Accurate, reproducible, and verifiable records are essential for an effective overall health and safety program. They also provide protection against liability and preclude situations where compliance cannot be demonstrated. Records should include medical assessment and respirator use approvals, certification of fit test, respirator eyeglass insert information, respirator maintenance records, and gas characterization information.

D. HAZARD ASSESSMENT AND IDENTIFICATION

A necessary step in the implementation of respiratory and bodily protection is the identification of the hazards to be protected against. Extreme caution is warranted in dealing with situations where LFG is detected within the explosive range. Other kinds of special hazards are listed under the section of this document titled "Safety Procedures for Well Drilling and Construction".

In the case of LFG, hazard assessment and identification should include a complete site-specific characterization of the gas. Initial characterization may be performed by gas chromatograph/mass spectrometer. Once chemicals are tentatively identified qualitatively, more specific quantitative data can be obtained using a more specific analytical detector for the classes of chemicals in question. The analytical method selected should be capable, at a minimum, of identifying those compounds of concern at concentration levels at or below any action levels set for those compounds (i.e., one half the TLV or PEL).

Identification is difficult due to the heterogeneous nature of landfills and the dynamic nature of the biological decomposition process occurring within the landfill. Hence LFG composition varies from site to site, as well as throughout any site. An appropriate initial characterization, however, can serve to generally predict chemicals that are present and their relative concentrations. When characterization is performed, care must be exercised in interpreting results, taking into consideration the specific limitations of the analytical methods and hardware used.

In addition to the fixed gases (CH_4, O_2, N_2, and CO_2), trace contaminants are present in LFG. There are literally hundreds to thousands of chemicals in LFG, most of which are at such low levels that it is impractical to identify all of them. Accuracy and sensitivity to a given class of chemicals will vary, depending upon the analytical procedures and equipment used. The chemicals which have received the most regulatory scrutiny are the volatile priority pollutants. These are generally aliphatic, aromatic, cyclical, and chlorinated hydrocarbons. Other classes of chemicals may also be present in LFG, gas condensate from various phases in a recovery process, and leachate. These may also include organic and inorganic acids and bases, sulfur compounds, metals, and metal hydrides.

The following is a brief (but incomplete) list of some of the priority pollutant chemicals of chief regulatory concern which may be found in LFG:

CHEMICAL	FORMULA
Benzene	C_6H_6
Chloroethene (Vinyl Chloride)	CH_2:CHCl
1,2-Dibromoethane (Ethylene Dibromide)	$BrCH_2CH_2Br$
1,2-Dichloroethane (Ethylene Dichloride)	$ClCH_2CH_2Cl$
Dichloromethane (Methylene Chloride)	CH_2Cl
Tetrachloroethylene (Perchloroethylene)	Cl_2C:CCl_2
Tetrachloromethane (Carbon Tetrachloride)	CCl_4
1,1,1-Trichloroethane (Methyl Chloroform)	CH_3CCl_3
Trichloroethylene	HClC:CCl_2
Trichloromethane (Chloroform)	$CHCl_3$
Hydrogen Sulfide	H_2S

E. SITE-SPECIFIC SAFETY PLANS

For special activities such as those mentioned above, a safety plan should be developed. This plan should be as site- and situation-specific as possible.

F. SAFETY MANAGEMENT

The following checklist comprises items that would be part of a minimum safety plan:

1. Designated safety persons shall be qualified to insure compliance with requirements and safety concerns.
2. Safety procedures shall be documented and reviewed with all workers prior to the start of work. A safety plan should be maintained at the job site.
3. Scheduled meetings should be held to review the safety program.
4. Unsafe acts should be stopped if discovered.
5. Required safety equipment shall be on site, and shall be checked for completeness and function.
6. If Air Purifying Respirators (APRs) are used, a written document should be prepared by each employer which describes the standard operating procedures governing selection and use of respirators, medical examination and approval, fit testing, respirator inspection, cleaning and disinfecting, repair, and storage.
7. All employees who may be required to wear respirators should be fit-tested and trained in the proper use of respirators.
8. Appropriate local authorities (fire department, air quality, etc.) should be notified prior to drilling, trenching, or flaring, etc.
9. Contracts for LFG testing, construction, or operation should include a safety procedures clause.

G. SAFETY EQUIPMENT

Workers engaged in construction or maintenance of LFG facilities should wear protective safety equipment as follows:

1. Hard hats, if near moving or mechanical equipment, or if working in confined spaces or where overhead hazards may exist (e.g., in excavations or around scaffolding).
2. Steel-toed, shoes or rubber boots.

3. Safety glasses and/or face shields, as appropriate.

4. Protective gloves if working with wet solid waste or where exposure to leachate or condensate is expected. Selection of protective materials is dependent on the potential hazards present and should be based on performance data and recommendations provided by material manufacturers.

5. Hearing protection, depending on noise level of work environment.

Other protective equipment may include:

1. Chemically protective overalls (e.g., Saranex, Tyvek, etc.)

2. Steel-toed steel shank neoprene boots.

3. Chemically protective gloves (e.g., Viton, neoprene, nitrile).

4. Respiratory protection as appropriate for the level of hazard, e.g., half-face and/or full-face APRs with NIOSH-approved organic vapor/acid gas (OV/AG) cartridges or canisters and appropriate dust/mist/fume capability.

5. A pressure demand self-contained breathing apparatus (SCBA), fitted with a pressure-demand type regulator and 30-minute (minimum) bottle or a supplied air system.

The following safety equipment should be available at the job site in quantities sufficient to cover the construction/testing crew:

1. Clean water, soap, and paper towels.

2. First aid kit, eye wash station, stretcher, and blanket.

3. Two Fire extinguishers - 20:A-80:BC.

4. "No Smoking" signs and/or barrier tape.

5. Two parachute-type harnesses and safety lines (for use in excavations, manholes, trenches and vaults, etc.)

6. CGA/oxygen indicator.

7. Hydrogen sulfide indicator (direct reading instrument or Dräger-type diffusion tubes).

8. Additional monitoring equipment for toxic vapors and aerosols.

9. Barricades and/or barrier tape.

10. Covers for excavations that will remain open at the end of the day.

11. Air-moving equipment that can provide ventilation if working in substandard air environments (trenches, condensate drain pits, etc.).

12. Fire-resistant blanket suitable for extinguishing a small fire or to provide heat to personnel in shock.

13. Construction equipment equipped with vertical exhaust or spark arrestors if within 2 feet of grade.

14. Flagging, traffic markers, and fluorescent orange safety vests for use when working around operating equipment or near public roadways.

H. PERSONAL HEALTH AND HYGIENE

1. Personal safety and the safety of fellow workers require that all employees arrive at the job and remain mentally alert. No alcohol or drugs are permitted. Smoking should be prohibited or limited on the landfill site. No worker should handle excavated solid waste without wearing gloves. Parts of the body accidentally exposed to waste, leachate, or condensate should be washed immediately with soap and water. Eating meals on the landfill should be discouraged.

2. Any cut or abrasion shall be treated immediately by a qualified professional health practitioner, as the chance of infection is high when working on a landfill. A tetanus shot is recommended at specified intervals for all personnel involved in site construction/testing activities.

3. Workers should avoid contact with hazardous plants, or those known or suspected to be hazardous, growing on the landfill.

4. Animals, snakes, spiders, and other insects should be avoided, especially around vaults and vault boxes. First aid supplies should include a snake bite kit. If unusual flora or fauna are expected, they should be identified as potential hazards in the site safety plan. Antidotes and/or medication should be maintained for persons with severe allergies.

5. The address, telephone number, and location map of the nearest hospital and medical emergency room should be prominently posted. In addition, the telephone number of an the ambulance and fire department/rescue unit should be prominently posted.

6. Workers should wash hands prior to eating, drinking, smoking, or changing clothes.

I. LANDFILL SAFETY PROCEDURES

1. As a general safety rule, LFG work should be performed by a team composed of a minimum of two people. In situations where hazards are minimal, and where it is necessary to allow an individual to work alone, another responsible individual must be aware of the lone workers task and scheduled time of completion/return, and if possible should monitor the individuals progress.

2. When working on (or within 1,000 feet of) an active or completed solid waste landfilled area, workers should be alert to the existence of (or potential for) hazardous conditions, e.g., the presence of LFG. A distance of 1,000 feet is used by some authorities as the maximum distance that LFG will migrate under average conditions. Migration distance, however, may be greater through underground conduits, in favorable subsurface soil conditions, or where surface conditions interfere with normal surface venting.

   Hazards that might occur could be one or more of the following:

   a. Fires may start spontaneously from exposed and/or decomposing waste.

   b. Fires and explosions in confined or enclosed spaces from the presence of methane gas.

   c. Landfill gases may cause oxygen deficiency in underground trenches, vaults, conduits, and structures.

   d. Hydrogen sulfide (H_2S) may be present. H_2S is a colorless, toxic, very flammable gas which, in low concentrations, has an offensive odor described as that of rotten eggs. H_2S, however, quickly numbs the olfactory senses so that reliance upon the sense of smell can lead to a very dangerous condition and even cause virtually instant death.

   e. Sudden subsidence or collapse of the landfill surface during activities such as drilling.

3. A *confined space* is defined as a space where existing ventilation is insufficient to remove dangerous air contamination and/or where there is an oxygen deficiency, and where ready access/egress to escape, provide aid, or to remove a disabled employee is difficult. Work in confined spaces is normally governed by strict procedural regulations, so check local codes.

4. In the case of flammable gases such as methane, a *dangerous air contamination due to flammability of a gas or vapor* is defined, (in California, Title 8, Article 108, Confined Spaces, Section 5156,) as any concentration greater than 20 percent of the lower explosive limit (LEL) for any substance. There is no equivalent Federal OSHA standard, so check local and state codes. An atmosphere considered to be an *immediately dangerous to life and health* (IDLH) atmosphere is one containing less than 19.5 percent oxygen by volume or one containing a concentration of another hazardous or toxic chemical at or above the limits set by NIOSH.

5. Note that while the Resource Conservation and Recovery Act (RCRA) (40 CFR, Part 257.3-8 Safety) places limits on the maximum allowable methane concentration in landfill facility structures, on or near landfills, at not to exceed 25 percent of the LEL or 1.25 percent methane gas in air (by volume), local OSHA regulations on flammable or combustible environments may place a more stringent requirement on the maximum concentration allowed in a working environment (i.e., an occupied structure which is not private and residential).

6. The flammable range for methane is approximately 5 to 15 percent in air at sea level at 25 Degrees C. As little as 0.3 millijoule of static electricity is sufficient to cause a methane ignition. This has been equated to 1/50 the amount of static electricity accumulated by a person walking across a carpeted floor on a dry day. The autoignition temperature of methane is 1004 Degrees F. The specific (vapor) density of methane is 0.6 that of air while the specific density of undiluted LFG is normally about 1.0 (close to that of air, depending on constituent concentrations). Therefore it should not be automatically assumed that because LFG contains methane the mixture is lighter than air and will rise. Behavior of LFG will vary with its constituent makeup which also varies.

7. Prior to the entry of workers into an excavation, vault, or ditch deeper than 3 feet, and routinely during construction, the atmosphere in the excavation should be tested for explosive concentrations, oxygen deficiency and H_2S levels. Air blowers or fans should be available for positive ventilation. A pressure-demand SCBA or supplied air respirator must be used when entering areas containing hazardous and/or oxygen-deficient atmospheres. APRs with chemical cartridges can be used for gaseous contaminants (but not H_2S) if all

of the following conditions are met: if the oxygen concentration is satisfactory, if the chemical contaminants have been identified, the concentrations have been monitored, the cartridges are effective in removing the contaminants, and all the contaminants have good warning properties. Mechanical filter respirators should be used only for protection against appropriate particulate matter for which they are rated.

8. Fires and explosions in confined spaces require a source of ignition. Smoking is strictly forbidden except in well-ventilated areas. Nonsparking and/or explosion-proof tools should be used in vaults, trenches, and other enclosed areas. Positive ventilation is required in construction shacks or other structures on or near a landfill. Temporary structures on the landfill surface should be constructed on blocks or other supports, with a ventilated area under the main floor. Construction equipment should be equipped with a vertical exhaust at least 5 feet above grade and/or with spark arrestors.

9. H_2S gas is usually always present at some concentration, generally below 100 ppm, in LFG. It is unlikely that hazardous concentrations of H_2S will build up (see Table 1) except in vaults or other confined spaces where oxygen deficiency may be a hazard. However, in special circumstances, where there is an natural or manmade presence of gypsum along with high moisture, for example, very high (lethal) concentration levels of H_2S may be produced at landfills. A large amount of construction debris containing wallboard concentrated in one location at a landfill would be another potential example. Thus, dangerous and unexpected pockets of H_2S gas could be encountered under certain circumstances. Personnel must be trained for, and alert to, these possibilities.

   One must always remain alert to observe such conditions. Air-purifying respirators are not normally effective against H_2S unless specifically rated for such use, and then only for a limited concentration and duration of use. In situations when high concentrations of H_2S are known or suspected pressure-demand SCBA or supplied air respirators should be used.

10. Employees with beards should not work in areas where snugly fitted air masks or respirators may be necessary. All employees should be fit-tested on the respirator that they will wear in order to assure a proper facepiece seal against the face. Fit-testing should reoccur at least annually.

11. For employees who wear glasses, respirator eyeglass inserts should be provided if full-face masks are used. The wearing of contact lenses with any type of respirator shall be prohibited.

TABLE 1

Physiological Response to Various Concentrations of Hydrogen Sulfide

Response	H_2S Concentration (ppm)
Maximum allowable concentration for prolonged exposure, 8 hours (1,2)	10
Slight symptoms after several hours	70-150
IDLH - level at which exposure is immediately dangerous to life and health (3)	300
Death possible/probable. Permanent nervous system damage.	400-700
Immediate death	1000

Note: Laboratories are often not able to properly analyze for H_2S due to its reactivity. Dräger diffusion type tube monitoring may be generally adequate, however other interferants, (e.g., SO_2,) are certain to be present and likely will render a falsely high reading, and therefore cannot be relied upon for accurate measurement. Note that when using Dräger diffusion type tubes, some interferants may mask detection of the chemical of interest.

References:

1. American Council of Governmental Industrial Hygienists Threshold Limit Value.

2. State of California Division of Safety, General Industry Safety Orders #5155,

3. National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, September 1985.

4. Chemical Hazards in the Workplace, Procter, N. and Hughes, J.; J.B. Lippencott Co., Philadelphia, Pennsylvania; 1978

J. SAFETY PROCEDURES FOR WELL DRILLING AND CONSTRUCTION

1. One person should be present at all times during construction. This person shall have the sole responsibility of assuring the observance of all safety procedures, and will be trained in the use of all recommended safety equipment.

2. Smoking shall not be permitted within 50 feet of a boring. No smoking on the landfill is preferred.

3. Fire extinguishers should be on hand during drilling (two 20:A-80:BC extinguishers are recommended). The drilling crew should be alert for the potential for the drill auger to spark against rock or metal causing a serious fire in the boring. LFG will typically burn almost invisibly under such circumstances. Fires should be extinguished by covering the boring with earth materials by using earth moving equipment. As a contingency before drilling, arrangements should be made to have a loader or equivalent equipment available or on call in case of a boring fire.

4. Any personnel working near the edge of a well (greater than 12 inches in diameter) under construction shall wear a parachute-type harness and safety line tied to an immobilized drill rig or some other safe immobilized structure, and/or shall work with a drilling platform in place. Due to the typically oxygen deficient environment "down hole," an individual who fell "down hole," even a short distance, would likely not survive until recovered. For this reason, it is preferable that all individuals working in the vicinity of drilling activities be tethered.

5. No worker shall be allowed to work alone at any time near the edge of the well under construction. At least one other worker shall be present, beyond the areas considered to be subject to the possible effects of LFG or cave-in. The number of persons working near the boring should also be limited to only the number necessary to accomplish the task, however there should always be sufficient workers present nearby to remove an injured worker or summon help.

6. During drilling, special consideration must be given to the less stable conditions represented by refuse, vis-à-vis compacted soil. Refuse must be considered more prone to instability that may cause side wall failure of the boring at any time. If this were to occur, the magnitude of the failure could be substantial. Individuals present at the time of failure could be buried in an oxygen deficient environment.

   It is imperative that the personnel performing drilling work remain alert at all times to changing subsurface conditions and signs of impending physical failure such as fissures, etc. It is not uncommon to experience a "hollowing out" effect creating a cavity at depth much larger than the boring due to side wall failure "down hole". This could cause a sudden collapse to occur at the surface. It should be remembered that the drill rig usually exerts a large and vibratory force at the surface in the vicinity of the boring.

7. Drilling personnel must be alert to the potential for encountering subsurface hazards, particularly in older landfills where screening of disposal materials may have been less controlled. Although rare, a variety of hazardous situations have been encountered while drilling in landfills especially near military or chemical processing facilities. These potential hazards include:

    - ♦ Unknown hazardous chemicals in drums or containers. These could include combustible or explosive, reactive, toxic or corrosive materials.
    - ♦ Military munitions.
    - ♦ Asbestos.
    - ♦ Compressed gas cylinders (CGCs).
    - ♦ Biomedical waste.
    - ♦ Radioactive waste.

8. Periodically during the well construction, the work area should be monitored for levels of methane, H_2S, vinyl chloride, benzene and/or other volatile organic chemicals.

9. If the well construction is not completed by the end of the working day, the hole shall be covered with a plate of sufficient overlap to prevent access to the hole and sufficient thickness and structural strength to support expected loads and the plate shall be weighted down to discourage removal. The edges of the plate shall be covered with a sufficient quantity of wet dirt to prevent gas from escaping. Barricades shall be placed around the covered hole outside the range of possible cave-ins.

10. All pipes shall be capped at the end of each working day.

11. An exhaust hood can be used to control venting LFG vapors while drilling to reduce personnel and environmental exposure. This is mandatory in some locales.

K. SAFETY PROCEDURES FOR EXCAVATION, TRENCHING AND PIPE INSTALLATION

1. Excavation permits and shoring may be required for excavations deeper than 4 to 5 feet (into which workers will enter). Check state regulations as standards and requirements vary.

2. One person should be present at all times during construction with the sole responsibility to observe all safety procedures. This person shall be trained in the use of all recommended safety equipment.

3. Smoking shall be prohibited within 50 feet of trenching and piping. No smoking on the landfill is preferred.

4. Prior to the entry of workers into an excavation deeper than 3 feet, and periodically during their work, the atmosphere in the excavation should be tested. If there are any doubts regarding safety, no worker shall be allowed to enter the excavation without at least a half-face or full-face OV/AG mask. If there is an oxygen deficiency, a concentration of any constituent with poor warning properties at a level greater than its TLV, or a concentration of hydrogen sulfide greater then 10 ppm, a pressure-demand SCBA or supplied air respirator with 5 minute emergency escape bottle should be used. If a combustible mixture of methane is present, further precautionary measures shall be taken; entry should be forbidden until the methane concentration is acceptable and at least below 1.0 percent by volume in air, or 20 percent of the LEL. If workers are not equipped with supplied air or pressure-demand SCBAs, then entry should be forbidden until the methane concentration is below 0.1 percent by volume in air, unless the Maximum Use Limitation (MUL) of the APR is greater. Workers required to work on an emergency basis, in any environment at or above the IDLH (the level immediately dangerous to life and health as declared and published by NIOSH) for any constituent component in the working environment, should be outfitted in pressure-demand SCBAs.

5. No worker should be allowed to work alone at any time in or near the excavation. Another worker shall be stationed, beyond the area considered to be subject to the possible effects of LFG. There should always be a sufficient number of workers present to remove an injured or endangered worker and to summon help.

6. Periodically during construction, the work area should be monitored for levels of methane, H_2S, vinyl chloride, benzene, and other volatile organic chemicals.

7. No worker may handle excavated solid waste without wearing appropriate work gloves and clothing, which will provide an adequate barrier to the waste.

8. Construction equipment should be equipped with a vertical exhaust at least 5 feet above grade and/or with spark arrestors.

9. Electrical motors, if used in the excavation area, shall be explosion-proof or non-sparking, totally enclosed fan cooled (TEFC); and electrical controls should be explosion-proof or intrinsically safe and meet the requirements for Class I, Division 2, Group D, (Methane), rated equipment in accordance with the National Electric Code (NEC).

10. No welding should be permitted in, on, or immediately near the excavation area, unless previously and continuously monitored for methane and other combustible gases.

11. Soil should be stockpiled near the excavation or well for use in smothering any combustion, should it occur.

12. Solvent cleaning, gluing, or bonding of pipe should be performed, to the extent possible, outside the trench. An organic vapor respirator shall be worn by persons using PVC solvents or glues. Personnel using solvent and cement shall be familiar with the appropriate materials safety data sheets for those products.

13. Forced ventilation may be required for workers who must work in trenches deeper than 3 feet. Air blowers and fans may be used for positive ventilation. Dilution ventilation may address either an explosive gas hazard or a hazardous chemical health hazard. The amount of air required for ventilation must be determined based on the concentrations of explosive LFG or hazardous chemical constituents, the LEL for methane or the TLVs for the hazardous chemical constituents in question, the volume to be protected, ambient conditions, and an appropriate safety factor. These calculations should be performed by a qualified individual.

14. During piping assembly, all valves should be closed immediately after installation.

15. As construction progresses, all valves should be closed as installed to prevent the migration of gases through the pipeline and gas collection system.

16. All piping shall be capped at the end of each working day.

L. GENERAL CONSTRUCTION/MAINTENANCE

1. When drilling on LFG collection system piping containing LFG, only explosion-proof electric or hand-powered drills should be used.

2. When using alternating-current powered power tools, a portable ground-fault current interrupter (GFCI) should be used.

3. When welding near gas recovery process equipment, suitable procedures and precautions should be employed including:

   - Processing a "hot work" permit. (A self-issued serial numbered permit is required in many states.)

   - Designate a specific, dedicated individual, by name, as a fire watch.

   - Verify that explosive concentrations are not present using an explosimeter.

   - Have adequate fire extinguishers (20:A-80:BC) and fire blankets on hand.

   - Sandbag all drains.

   - Provide the appropriate purge and inert blanket on process equipment and piping.

   Procedures for safe welding and purging of process equipment are available from the American Petroleum Institute (API).

M. SHORING AND BRACING

1. No person shall enter any trench deeper than 4 to 5 feet unless the trench has been shored, braced, sloped, or other provisions made to prevent cave-in. Shoring shall be engineered by a qualified and licensed civil or structural engineer or engineering geologist. Drawings, specifications, and calculations shall be signed by the engineer.

2. Special consideration must be given to the less stable conditions represented by refuse vis-à-vis compacted soil. Refuse must be considered more prone to instability that may cause slope or side wall failure. This is due to the high void ratio, irregularity of material composing the refuse, and a typically lesser degree of compaction than soil.

N. FIELD SAMPLING FOR HEALTH AND SAFETY

1. The following instruments will remain at the job and be continuously employed by a qualified person:

    - H_2S chemical reagent diffusion tube indicator or direct reading instrument.

    - Oxygen analyzer.

    - CGA (methane analyzer).

2. CGAs and other electronic portable monitoring instruments should be rated explosion-proof or intrinsically safe. It is also recommended that they be Factory Mutual rated.

3. It is important that any site always be initially characterized so that correct information can be available to make appropriate decisions about personnel exposure safety.

4. To accomplish Item 3, a gas sample should be collected prior to the beginning of work or as soon as possible, and should be analyzed for volatile organic chemicals. If historical information or preliminary field screening indicate a need, the sample should also be analyzed for heavy metals capable of volatilizing, acid gases, and other inorganic compounds. Proper instructions and close coordination with the laboratory are important to properly characterize the gas. Several composite samples will provide a more uniform representation of LFG at the site. Several non-composited samples, may however, provide a better indication of peak concentrations and show chemicals which would not be indicated in the composite samples.

5. Monitoring for vinyl chloride, benzene, or other constituent chemicals may also need to be conducted during drilling operations. A written record of monitoring should be maintained daily.

O. RESPIRATORY PROTECTION

1. All employees who may be required to wear respirators shall be trained in the proper use of respirators. Such individuals will have an appropriate physical examination for use of respirators. Each individual will be approved by a qualified physician for such respirator use. All personnel who wear respirators shall come under the jurisdiction of their employer's written respiratory protection program, and will follow and be knowledgeable about the program.

Personnel will be individually fit-tested wearing their assigned respirator. Fit-testing will be conducted with isoamyl acetate for organic vapor cartridges and irritant smoke (stannic chloride) for particulate filter cartridges prior to respirator use on site. The above notwithstanding, these provisions should not be intended to preclude otherwise unauthorized personnel from emergency use of respirators or voluntary upgrading. Documentation for compliance with these provisions should be maintained.

2. Persons with interfering facial hair shall not be permitted in areas where respiratory protection equipment is required; i.e., beards are prohibited.

3. Permanent damage to the eyes (cornea) from acid gases and particulates may result if contact lenses are worn. Therefore, wearing contact lenses on site shall be prohibited. Those persons shall have prescription spectacle inserts installed in their respiratory protective equipment.

4. All NIOSH procedures and guidelines for respirator selection and use should be adhered to. Only equipment certified by NIOSH in its most recent certified equipment list will be used. APRs with chemical cartridges can only be used for acid gas/organic solvent vapors under the following conditions:

    - If the oxygen concentration is satisfactory.
    - If the chemical contaminants have been identified.
    - The concentrations are monitored.
    - The chemical filter cartridges are effective in removing the contaminants.
    - The cartridges are approved for such use (by NIOSH).
    - The contaminants have good warning properties.

If all of the above conditions cannot be satisfied, then Level B protection using pressure-demand SCBAs or supplied air is required. APRs with chemical cartridges/canisters will not be used for protection in environments containing constituents which have poor warning properties, and which are at or above, or can reasonably be expected to be near, at, and/or above the limitation of the protection factor (PF) for the respirator. The maximum working environment shall be determined by multiplying the PF for the type of respirator by the TLV for the chemical substance under consideration, (MUC = PF X TLV). A list of PFs is shown in TABLE 2.

TABLE 2
Table of Respiratory Protection Equipment Protection Factors

Type of Air Purifying Respirator	Protection Factor
Half-face APR	10
Full-face APR	100
When employed for protection from benzene. See Note 1.	50
When employed for protection from vinyl chloride using vinyl chloride rated specific canister with a 4 hour service life. See Notes 2 and 3.	25
Pressure-Demand SCBA or supplied air-line respirators	10,000

NOTE 1: See the Benzene Standard, 29 CFR 1910.1028.

NOTE 2: See the Vinyl Chlorine Standard, 29 CFR 1910.1017.

NOTE 3: Because respirator cartridges/canisters meeting the service life requirements listed in 29 CFR 1910.1017 (g) are not normally available, work involving vinyl chloride concentrations above the action level of 0.5 ppm will require use of pressure-demand SCBAs.

5. Pressure demand SCBA or pressure demand supplied-air full-face masks shall be used when entering areas containing oxygen-deficient atmospheres, unknown atmospheres, or atmospheres considered to be at or above IDLH levels. Personnel (with appropriate SCBA apparatus) will not enter IDLH environments without emergency justification by and approval of a site safety manager or responsible project manager. An emergency is constituted by an already existing life threatening situation.

6. The length of time an APR canister or cartridge is effective in removing hazardous material from the ambient air will depend on the type and concentration of hazardous material in the air and the level of effort required for a worker to accomplish his assigned tasks. The higher the breathing rate, the more frequently canisters will need to be replaced. These maximum operating periods vary according to manufacturer, so it will be necessary to monitor the total usage of cartridges and canisters during all work requiring a respirator.

P. SPECIAL CONDITIONS

Certain types of work may present unusual problems at certain sites with special conditions. Examples include the following:

1. For protection against infectious waste, a Tyvek suit, appropriate gloves and boots, and a NIOSH-approved respirator with a high-efficiency particulate filter (HEPA) incorporated in the mask canister or cartridge, are suggested. Personnel should avoid or minimize contact with any waste, and be cautioned about possible contact with sharp objects such as needles. The HEPA filter may be combined with an OV/AG cartridge or canister.

2. For protection against gas vapors while drilling or while working around an open well casing, a NIOSH-approved full-face air-purifying respirator with an OV/AG canister including a HEPA filter may be necessary. The Saranex or Tyvek suit are also required. Also, appropriate gloves and boots. Appropriate measures must be taken to prevent heat stress.

3. For protection from asbestos fibers, the minimum required includes a respirator with a HEPA filter and a Tyvek suit. The Tyvek suit may either be coated or uncoated. Special regulations exist for asbestos, for complete requirements see the Asbestos Standard, 29 CFR 1910.1001.

4. A determination may need to be made regarding whether additional protection will be required, if significant levels of vinyl chloride or benzene (or other more toxic chemicals) are found during characterization. The action levels for vinyl

chloride and benzene are one-half of 1 ppm. The maximum threshold limit value of benzene or vinyl chloride to which workers may be exposed over an 8-hour period is 1 ppm. The maximum concentration of vinyl chloride to which workers may be exposed in any given period is 5 ppm. If higher levels of vinyl chloride are found, respiratory protection levels may need to be adjusted to Level B (SCBA or supplied air) if engineering controls cannot reduce these levels. Because vinyl chloride and benzene are both regulated carcinogens, it is imperative and required that exposure be limited where at all possible; if not, then exposure must be reduced to the minimum possible extent through appropriate respiratory protection (i.e., vinyl chloride and benzene exposure should be held to zero whenever possible). For the Vinyl Chloride Standard, see 29 CFR 1910.1017. For the Benzene Standard, see 29 CFR 1910.1028.

5. Special compliance requirements apply for personnel who must work with potential exposure to certain chemicals including vinyl chloride, benzene, and asbestos above action levels. Compliance requirements may vary with each compound and by state, but will likely include:

   - Mandatory training.
   - Medical record keeping.
   - Exposure monitoring, and record keeping.
   - Certifications.
   - Specific protective equipment requirements.

GLOSSARY OF HEALTH AND SAFETY ACRONYMS

ACGIH - American Conference of Governmental Industrial Hygienists

API - American Petroleum Institute

APRs - Air purifying respirators

C - Ceiling exposure limit

CO_2 - Carbon dioxide

CGA - Combustible gas analyzer

CGCs - Compressed gas cylinders

CH_4 - Methane

GFCI - Ground-fault current interrupter

H_2S - Hydrogen sulfide

HEPA - High-efficiency particulate filter

IDLH - Immediately Dangerous to Life and Health

LEL - Lower explosive limit

LFG - Landfill gas

MSDSs - Material Safety Data Sheets

MUC - Maximum Use Concentration

MUL - Maximum Use Limitation

N_2 - Nitrogen

NEC - National Electric Code

NIOSH - National Institute of Occupational Safety and Health

GLOSSARY OF HEALTH AND SAFETY ACRONYMS cont'

O_2 - Oxygen

OSHA - Occupational Safety and Health Act

OVA-FID - Organic vapor analyzer-flame ionization detector

OV/AG - Organic vapor/acid gas

PEL - Permissible Exposure Limit

PF - Protection factor

PPM - Parts-per-million

RCRA - Resource Conservation and Recovery Act

REL - Recommended Exposure Limit

SCBA - Self-contained breathing apparatus (pressure demand type)

SO_2 - Sulfur dioxide

TLV - Threshold Limit Value

TLV-STEL - Threshold Limit Value/Short-Term Exposure Limit

TLV-TWA - Threshold Limit Value/Time-Weighted-Average

REFERENCES

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2. California Administrative Code, Title 8, General Industry Safety Orders, State of California Department of Industrial Relations.
3. California Administrative Code, Title 8, Section 5155, (General Industry Safety Order 5155), Airborne Contaminants. State of California Department of Industrial Relations. November 1986. (Reprint).
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5. California Administrative Code, Title 8, General Industry Safety Orders Section 5144, Respiratory Protective Equipment. September 1985. (Reprint)
6. CHRIS Hazardous Chemical Data, U. S. Department of Transportation, United States Coast Guard, November 1984. Commandant Instruction M.16465.12A, November 1984.
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11. Code of Federal Regulations, Title 29, Labor, Part 1910.134, Respiratory Protection, Occupational Safety and Health Standards, Occupational Safety and Health Administration, 1990.

12. Code of Federal Regulations, Title 29, Labor, Part 1910.1000, Subpart Z-Toxic and Hazardous Substances, Occupational Safety and Health Standards, Occupational Safety and Health Administration, 1990.

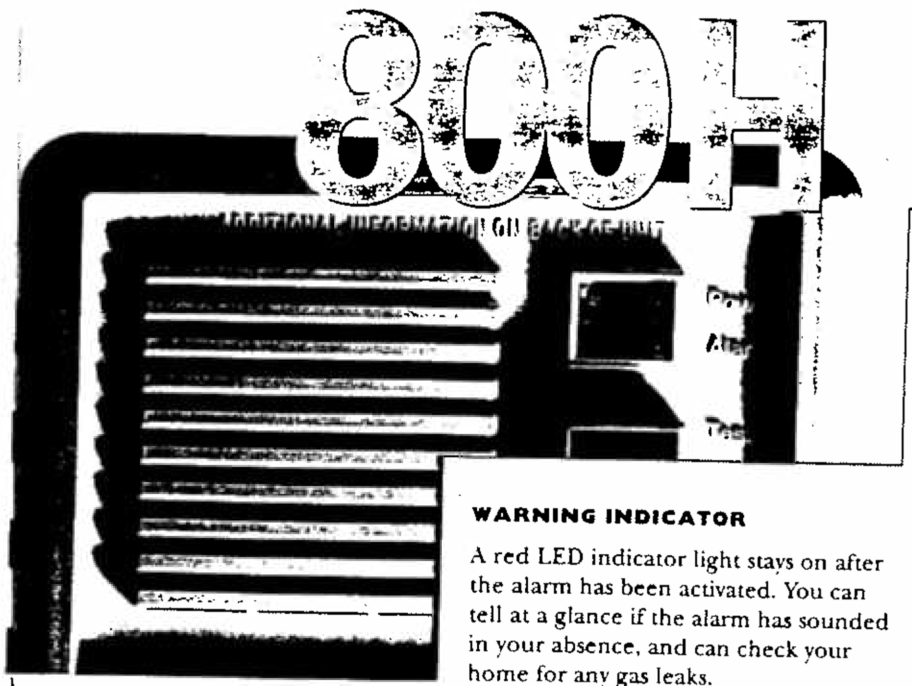
13. Code of Federal Regulations, Title 29, Labor, Part 1910.1200, Hazard Communication, Occupational Safety and Health Standards, Occupational Safety and Health Administration, 1990.

14. National Fire Protection Association, Fire Protection Guide, 16th Edition, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269, 1986.

15. U.S. Department of Health and Human Services, NIOSH Guide to Industrial Respiratory Protection, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication Number 87-116, September 1987.

16. U.S. Department of Health and Human Services, NIOSH Pocket Guide to Chemical Hazards, DHHS (NIOSH) publication no. 90-117, National Institute for Occupational Safety and Health, Cincinnati, Ohio, June 1990.

Appendix B
Example Building Monitoring Instruments



Early-warning residential gas alarm

ARLY DETECTION OF COMBUSTIBLE GASES

The Dicon 800H is designed to detect oth natural (methane) and propane gases at concentrations in excess of 25% of the Lower Explosive Limit (LEL) – e level at which an air-gas mixture comes explosive.

ULTRA-SENSITIVE

he LEL for propane is 2.1%; for natur- gas, 3.8%. The ultra-sensitive Dicon 800H detects concentrations in excess of 2% for propane and .95% for natural s, ensuring that homeowners are alerted long before gases can build up to explosive levels.

SY TO INSTALL

The Dicon 800H is simple to install and erate. Each alarm includes an AC apter, template and mounting screws.

PIEZO-ELECTRIC ALARM

oud (85dB), solid-state electronic horn sounds the instant the 800H detects dangerous gas concentrations ove its calibrated thresholds.The rm is intermittent – one second on, one second off – to distinguish it from most smoke alarm signals.

TOMATIC ALARM SHUT-OFF

s soon as gas concentration returns to eptable levels, the 800H automatical- eturns to non alarm state.

WARNING INDICATOR

A red LED indicator light stays on after the alarm has been activated. You can tell at a glance if the alarm has sounded in your absence, and can check your home for any gas leaks.

NO ADJUSTMENTS REQUIRED

The gas-sensitivity level is set and sealed at the factory for your convenience and protection.

SUPERVISED SENSOR

An audible trouble beep and illumination of the red alarm light warn of possible trouble in the gas sensor or power supply.

LED OPERATING LIGHT

Continuous green light confirms that the unit is receiving power.

ALARM-READY INDICATOR

At the end of its initial warm-up period, unit beeps once to indicate that it is ready for operation.

CONVENIENT TEST SWITCH

Large, easy-access test switch checks alarm circuitry and horn by electronically simulating gas detection.

WARRANTY

The Dicon 800H is fully warranted against manufacturing defects for one year from date of purchase.

SPECIFICATIONS

Sensitivity:	Meets ULI 1484: 25% of the LEL of natural/propane gas
Operating Voltage:	12V DC with an AC adaptor for 120V residential use
Standby Current:	200 mA
Alarm Level:	85dB at 10 feet (3 m)
Indicator Light:	Solid-state green LED indicates that alarm is receiving power
Test Button:	Tests circuitry and horn.
Temperature:	32°F to 120°F (0°C to 49°C)
Relative Humidity:	Up to 90%
Dimensions:	4.6" (117 mm) diameter 3.6" (92 mm) height
Weight:	19 oz. (544 g)

Specifications are subject to change.

ALSO AVAILABLE

The **Dicon 800T** propane gas alarm is a rechargeable, battery-powered unit deigned for travel trailers and campers.

Specification sheet no. 4-177
For further information or technical assistance,
please telephone or write to:

DICON SAFETY PRODUCTS INC.
719 CLAYSON ROAD
TORONTO, ONT. M9M 2H4
Tel: (416) ~~745-0150~~ 496-5900
Fax: (416) 745-0613

Tel (708) 850-7255
Fax (708) 850-9209

DICON
GAS ALARMS

P2140-KP Methane (Ch4) Monitor

Conspec's P2140-KP Methane Monitor is a microprocessor based sensor designed to detect methane gas and provide the user with non-intrusive, automatic calibration features for easy installation and maintenance. This low powered instrument can be used as a stand-alone controller to provide alarms upon detection of high levels of gas, or it can communicate to any central monitoring system by use of the onboard alarm relays, or the optional 4-20 MA analog output signal. In either case, the user can adjust the alarm setpoints, or calibrate the unit using the keypad on the front of the unit.

FEATURES

* Nema 4x Non-Metallic Enclosure
* Methane Range: 0-5 % CH4
* Automatic Calibration Feature
* LCD Display with Keypad
* 2-Alarm Setpoints
* Sensor Fail Indication
* Stand-Alone Capability
* Power Input: 15VDC
* MSHA Evaluated for I.S. Areas
* 4-20 MA Output Signal

SPECIFICATIONS

* Dimensions: 11"H x 8"W x 4.5"D
* Weight: 5 lbs.
* LCD Display with Keypad
* 2-Alarm Setpoints and Sensor Fail
* MSHA Class "G" for Intrinsically Safe
* Sensor Type: Catalyctic Bead REPLACEMENT PARTS * P2065 Smart Card
* P1246 Replacement CH4 Cell
* P2034 Cell Interface Card
* P2536-1 Cell (only)

I.S. SECTION ALARM

P2140 Combination Methane Monitor/Section Alarm for I.S. Areas includes Audio and Visual Alarms with Silence Button. MSHA Class "G" for I.S. Areas.

CONSPEC CONTROLS LTD.

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Tianjin China
Tel: 022 532 9165
Fax: 022 532 9049

CONSPEC - BBS

Modem: 416-661-8303

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INDUSTRIAL SCIENTIFIC CORPORATION

Preserving human life is our life's work.

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TMX412 Multi-Gas Monitor

Overview | Features | Specifications | Ordering Info

Detects four gases simultaneously, including LEL or CH4, Oxygen, and any two of the following: Carbon Monoxide, Chloringe, Hydrogen Sulfide, Nitrogen Dioxide, and Sulfur Dioxide.

Overview- Industrial Scientific Corporation introduces the TMX412 Multi-Gas Monitor. A compact instrument designed to offer safety, flexibility and reliability for atmospheric testing, especially in confined space applications. The TMX412 monitors up to four gases simultaneously and continuously: combustible gases (LEL or CH4), oxygen and any one or two of five toxic gases: carbon monoxide, chlorine, hydrogen sulfide, nitrogen dioxide and sulfur dioxide. An optional data logging industrial hygiene feature adds even more versatility. Just as important, the TMX412 combines Industrial Scientific's hallmark durability and uncompromising quality, with easy-to-use features that make it an ideal instrument for any industry. Preserving human life is our life's work.SM

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Features

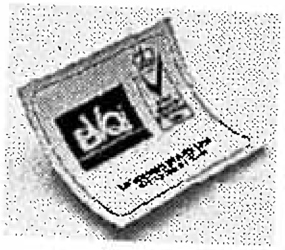
Easier Continuous Monitoring of Combustible Gases, Toxic Gases and Oxygen

Human life is constantly threatened in working areas where combustible or toxic gases can accumulate or oxygen becomes depleted/enriched. Industrial Scientific's TMX412 was developed to provide effective warning to preserve human life under these dangerous conditions. The TMX412 provides continuous monitoring of up to four- combustible gases, oxygen and one or two of five toxic gases (see below). An optional data logging industrial hygiene feature calculates Short-Term Exposure Limits (STEL), Time-Weighted Average (TWA) readings and stores the last calibration date. Such versatility makes the TMX412 an ideal solution for almost any environment where atmospheric testing is needed. Better still, the TMX412 is easy to use. A single button controls the On/Off function and selects all display modes. A convenient keypad switch is used for activating the backlight, zeroing the instrument and clearing peak readings. A removable overlay reveals two unmarked switches to enter calibration and alarm settings. During operation, a prompt scrolls across the screen informing the user of all options from that mode. It's like having the owner's manual built right in the instrument.

Interchangeable Sensors Add Greater Flexibility

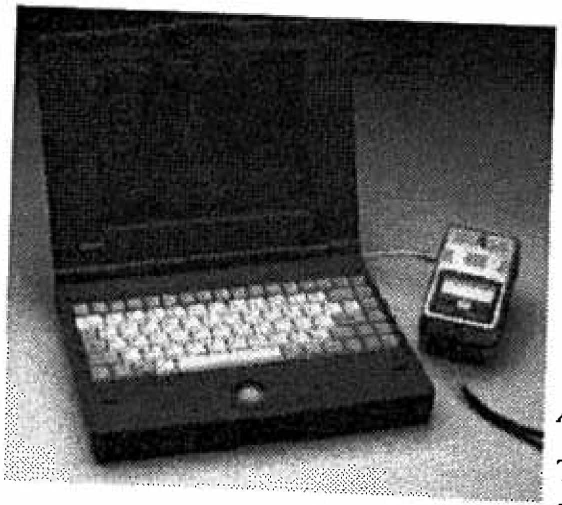
The TMX412 is available in a wide array of configurations to meet your needs. In addition to combustible gases and oxygen, users can select any one or two of the following toxic gases: carbon monoxide, chlorine, hydrogen sulfide, nitrogen dioxide and sulfur dioxide. Industrial Scientific's plug-in sensor design makes it easy to change sensors, even in the field. No special tools or soldering is necessary. The TMX412 automatically recognizes which sensors are installed and displays them on the screen. If a sensor has failed calibration, is missing or has been removed, the unit will not provide a reading.

Durability... an Industrial Scientific Hallmark



Industrial Scientific Corporation is the first gas monitoring instrument manufacturer in North America to be certified under the ISO9001 Quality Standard, an internationally-recognized certification for high quality. The TMX412 is the latest example of our commitment to the highest standards. The TMX412 is classified as intrinsically safe or pending classification by Underwriters Laboratories, Canadian Standards Association, Factory Mutual and Mine Safety and Health Administration. The instrument's case is constructed of rugged stainless steel, ensuring resistance to Radio Frequency Interference (RFI). The unit is also equipped with shock-resistant electronics and sensors, so it will resist almost any impact. The TMX412 features a sensor membrane filter for resistance against water, dirt, dust and mild corrosives.

Data Logging Industrial Hygiene Monitoring



For industrial hygiene monitoring, the TMX412 can be upgraded to a hygiene instrument. A real-time clock/calendar and data-logger calculate and record Real Time, Short-Term Exposure Limit (STEL) and Time-Weighted Average (TWA) values. Additionally, the TMX412 automatically stores the last calibration date. With the data logging hygiene option installed, the TMX412 features a large memory capacity capable of storing approximately 110 hours of logged data (one-minute logging intervals) with four sensors installed. (More on the data logging feature.)

Audible and Visual Alarms

The TMX412 offers simultaneous audible and visual alarms to warn the user of potentially dangerous conditions. Low and high alarm values are preset to current OSHA standards and can be reset by the user if desired. Low alarm conditions are indicated by a single-tone pulsed alarm and simultaneous red flashing LEDs. High alarm conditions are more intense and feature a warbling-tone audible alarm, along with the visual warning LEDs. The display is also illuminated while in alarm condition. The LEL/CH4 sensor is protected by an over-range circuit to protect the sensor from possible damage. If the unit detects combustible gases in excess of 100% of LEL or 5.0% of CH4, by volume, a high alarm condition is automatically latched and internal circuitry protects the sensor. Optional audible/visual and vibrating external alarms are used to ensure alarm recognition in high-noise areas. These devices are conveniently plugged into the unit's side jack.

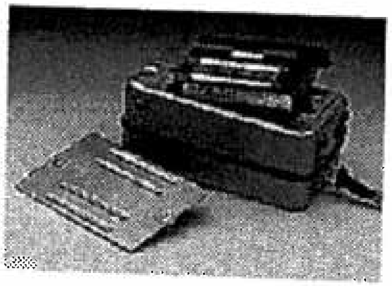
Easy-to-Read Display

The TMX412 features an easy-to-read liquid crystal display (LCD) that indicates all gases being monitored. The instrument's keypad activates backlights to make the TMX412 easy to read under low light conditions.

Accessories

A complete line of accessories for the TMX412 help make the instrument even more versatile. Calibration equipment can be ordered for accurately calibrating the TMX412. Appropriate calibration gas is available for all sensors. Audible/visual and vibrating alarms are available for high-noise work environments. Also available from Industrial Scientific is a VHS video cassette for training in the use, calibration and maintenance of the TMX412 Multi-Gas Monitor.

Rechargeable Battery Pack



The TMX412 is powered by a rechargeable nickel-cadmium battery pack that will operate continuously for 10 hours when fully charged. The battery pack can be charged in or out of the instrument. Single-unit, two-unit and five-unit dual rate chargers provide a 4.5-hour recharge time. An economy charger is also available and can fully recharge the TMX412's battery in 10 hours.

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Specifications

Case:	Stainless Steel Dimensions: 4.75 x 2.75 x 2 inches (121 x 70 x 51 mm)
Weight:	26 ounces (738 grams)
Sensors:	Combustible Gases and Methane Catalytic Oxygen and Toxic Gases Electrochemical
Measuring Range:	Combustible Gases 0 to 100% LEL in 1% increments Methane 0 to 5% of volume in 0.1% increments Oxygen -0 to 30% of volume in 0.1% increments Carbon Monoxide -0 to 999 PPM in 1 PPM increments Hydrogen Sulfide -0 to 999 PPM in 1 PPM increments Sulfur Dioxide -0 to 99.9 PPM in 0.1 PPM increments Nitrogen Dioxide - 0 to 99.9 PPM in 0.1 PPM increments Chlorine - 0 to 99.9 PPM in 0.1 PPM increments
Power Source:	Rechargeable nickel-cadmium battery pack
Battery Life:	With combustible sensor 10 hours (Ni-Cad) Without combustible sensor 10 days (Ni-Cad)
Display:	Alpha-Numeric Liquid Crystal Type
Temperature Range:	Continuous Operation: -15°C to 40°C (5°F to 104°F) Intermittent Operation: - 20°C to 55°C (-40° F to 131°F)
Humidity Range:	(Non-condensing)

Continuous Operation:	15% to 90% RH
Intermittent Operation:	0% to 99% RH

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Ordering Info

Accessories

Part No.	**Description**
1704-1856	Combustible Sensor
1702-3516	Oxygen Sensor
1704-1898	Hydrogen Sulfide Sensor
1704-1880	Carbon Monoxide Sensor
1704-1914	Chlorine Sensor
1704-1922	Nitrogen Dioxide Sensor
1704-1906	Sulfur Dioxide Sensor
1810-2194	Hygiene Option (Board Only)
1810-2195	Software Kit (Disks & Cables)
1810-1816	115 VAC Compact Economy Charger
1810-1964	115 VAC Two Unit Trickle Charger
1810-1998	115 VAC Five Unit Trickle Charger
1810-1873	115 VAC One Unit Dual Rate Charger
1810-1907	115 VAC Two Unit Dual Rate Charger
1810-1881	115 VAC Five Unit Dual Rate Charger
1810-2137	115 VAC Twelve Unit Trickle Charger
1810-2004	230 VAC One Unit Trickle Charger
1810-1956	230 VAC Five Unit Trickle Charger
1810-1972	230 VAC One Unit Dual Rate Charger
1810-1980	230 VAC Two Unit Dual Rate Charger
1810-2012	230 VAC Five Unit Dual Rate Charger
1810-1899	12 VDC One Unit Dual Rate Charger
1810-1915	12 VDC Two Unit Dual Rate Charger
1810-2156	SP402 Sampling Pump with Hose (UL)
1810-2169*	SP402 Sampling Pump with Hose (CSA)
1810-2161	Leather Carrying Case for SP402/TMX Combination
1810-1824	Leather Carrying Case for TMX (Included)

1810-1840	Transport Case for TMX and Accessories
1810-1857	Hand Pump with Hose
1810-1386	Stainless Steel Extendable Probe
1810-1428	Polycarbonate Probe
1810-2111 4.5	Foot Folding Probe
1704-1872	Battery Pack (Spare)
1810-1154*	External Alarm
1810-2146*	Vibrating Alarm

* Denotes CSA approved accessory

Calibration Equipment

1810-1576	Cylinder, Cal. Gas, Carbon Monoxide, Pentane and Oxygen
1810-1584	Cylinder, Cal. Gas, Free Air
1810-2187	Cylinder, Cal. Gas, CO, H2S, Pentane and Oxygen
1810-2186	Cylinder, Cal. Gas, H2S and Pentane
1810-0719	Cylinder, Cal. Gas, 50 PPM Carbon Monoxide
1810-0859	Cylinder, Cal. Gas, 25 PPM Hydrogen Sulfide
1810-1220	Cylinder, Cal. Gas, 10 PPM Sulfur Dioxide
1810-1758	Cylinder, Cal. Gas, 10 PPM Chlorine
1810-1477	Cylinder, Cal. Gas, 25 PPM Nitrogen Dioxide
1810-1766	Flow Regulator with Pressure Gauge
1704-4157	Teflon Tubing (18")
1704-2839	Calibration Cup

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Industrial Scientific
1001 Oakdale Road,
Oakdale, PA 15071 - 1500
(412) 788-4353
Toll Free 1-800-DETECTS
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Send Comments or Questions to:info@indsci.com

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INDUSTRIAL SCIENTIFIC CORPORATION

FAMILY OF PRODUCTS

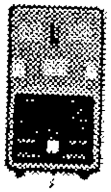
GAS DETECTION INSTRUMENTS

GasBadge™

A personal gas alarm that will give one year of maintenance-free operation. After one year the unit can be disposed or returned and renewed to last another year. Available for carbon monoxide, hydrogen sulfide or oxygen.

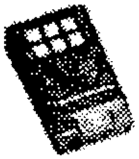
LTX310 Multi-Gas Monitor

LTX310 A multi-gas monitor for up to three gases. Provides continuous monitoring of oxygen, combustible gases (LEL or CH4), and any one of eight toxic gases. Interchangeable toxic sensors include: ammonia, carbon monoxide, chlorine, hydrogen cyanide, hydrogen sulfide, nitric oxide, nitrogen dioxide, and sulfur dioxide.



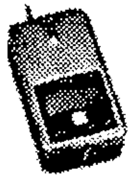
TMX412 Multi-Gas Monitor

TMX412 A multi-gas monitor for one to four gases. Will continuously monitor oxygen, combustible gases (LEL or CH4) and one or two toxic gases, including carbon monoxide, chlorine, hydrogen sulfide, nitrogen dioxide and sulfur dioxide.



STX70 Personal Gas Monitor

STX70 A single gas monitor for oxygen or any one of eight toxic gases. Features plug-in interchangeable sensors to make the instrument very easy to reconfigure. Available as display and non-display versions, with optional industrial hygiene data-logging functions.

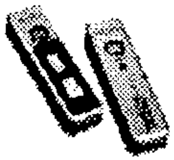


MDU420 Dual-Range Methane Monitor

An infrared, dual-range methane monitor. Measures from 0 to 100% LEL and then autoranges up to 100% by volume.

Carbon Monoxide Monitor RS5100

A fixed point carbon monoxide area monitor. Measures from 0 to 1999 ppm CO. Has extra large red LED digital display and various optional alarm horn and strobe light combinations.



Hydrogen Sulfide Monitors HS560 With Display

A single gas hydrogen sulfide monitor available with digital display or non display alarm only configurations.

Combustible-Gas Monitor LD 322

A combustible gas monitor for common hydrocarbons from 0 to 100% LEL or user changeable to be methane specific from 0 to 5% by volume.

200 Series Gas Monitors

One of a group of single gas, alkaline battery powered monitors. Available for chlorine, carbon monoxide, hydrogen sulfide, nitrogen dioxide, oxygen, or sulfur dioxide.

Industrial Scientific Accessories

Industrial Scientific offers a complete line of gas monitoring accessories to maximize user protection and enhance the operation of the instruments.

FIXED SYSTEMS

Controller 8000 Fixed Monitoring Systems

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Request Further Information

LTX 310 Multi-Gas Monitor

Overview | Features | Diagram | Specifications | Ordering Info

The LTX 310 simultaneously monitors up to three gases continuously, offering incredible flexibility in an easy-to-use configuration.

Overview- Industrial Scientific introduces the LTX310 Multi-Gas Monitor...our most flexible unit ever. Using the portable LTX310, you'll receive the security of continuous monitoring during potentially hazardous or life-threatening conditions. The LTX310 simultaneously monitors up to three gases continuously: combustible gases (LEL or CH4), Oxygen and any one of several toxic gases. Toxic sensors are easily changed, even in the field. Most important, the LTX310 combines Industrial Scientific's hallmark durability and uncompromising quality in an easy-to-use configuration designed for users in any industry.

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Features

Continuous Monitoring of Combustible Gases, Toxic Gases and Oxygen.

Human life is constantly threatened in working areas where combustible or toxic gases can accumulate or oxygen becomes depleted or enriched. Industrial Scientific developed the LTX310 to provide effective warning to preserve human life under these dangerous conditions. The LTX310 provides continuous monitoring of combustible gases, oxygen and any one of several toxic gases (see below). This flexibility makes it an ideal monitoring device for almost any condition. The LTX310 is an easy-to-use monitor designed to be both convenient and practical. Weighing just 20.4 ounces, the unit can easily be carried or tucked into its leather carrying case. And, because it's from Industrial Scientific, you can be assured it features rugged construction and state-of-the-art sensors and design.

Flexibility: LEL, Oxygen and One of Several Toxic Gas Sensors.

In addition to combustible gas and Oxygen, users can select any one of the following toxic gas sensors: Ammonia, Carbon Monoxide, Chlorine, Hydrogen Cyanide, Hydrogen Sulfide, Nitric Oxide, Nitrogen Dioxide and Sulfur Dioxide. Sensors are easily removed and can be replaced in the field in minutes. No special tools or soldering is necessary. The LTX310 automatically recognizes and identifies which sensors are installed and presets alarms to recommended levels when the sensor is calibrated. Alarm set points and calibration parameters can be changed by the user, if desired.

New Features, Easy to Operate

The LTX310 adds several new features to make the instrument easier than ever to use. An easy-to-find power switch has been added for simplified operation. Once turned on, battery status appears on the LCD screen, followed by a text display of gases being detected. The power switch also features a delay that prevents the LTX310 from being turned on or off accidentally. During operation, a prompt scrolls across the unit's display informing the user of current operation choices from that mode. This feature makes it easier for users to get from one mode to the next. A text mode masks readings and simply flashes "OK" when gas levels are acceptable. This mode is ideal for situations where simplicity is important. If an alarm situation is encountered, both the audible and visual alarms are activated immediately. The LTX310 also simplifies the process for calibration, peak clearing, zeroing and changing sensors and batteries.

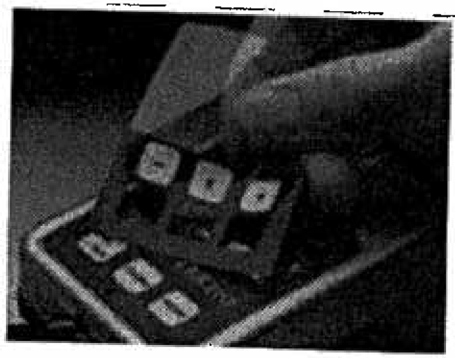
Durable, Compact, Lightweight...Reliable

The LTX310 is classified intrinsically safe for use in both Class I and Class II locations, making it the ideal monitor for a wide variety of applications. The unit is designed to withstand the toughest environments and situations. Or accidents. The instrument's case is constructed of rugged stainless steel, ensuring resistance to Radio Frequency Interference (RFI). Internally, the unit is equipped with shock-resistant electronics and sensors, preparing it for the worst of impacts. The unit also provides protection against dirt, dust and mild corrosives.

Audible and Visual Alarms

The LTX310 simultaneously activates both audible and visual alarms for maximum protection. Low and high alarm settings for combustible and toxic gases are preset by Industrial Scientific and can be reset by the user to any alarm point desired. When the gas concentration exceeds a preset exposure limit, a single tone pulsed alarm sounds. Two high intensity, red LEDs located behind the display window flash and the display backlight is turned on during an alarm condition. The LTX310 also offers enrichment and depletion alarms for oxygen monitoring. The unit also offers users the choice between latching or non-latching alarms. In the latching alarm mode, a triggered alarm condition remains even after the concentration has fallen below the specified threshold. The alarms must then be manually reset in a safe atmosphere. The combustible sensor also employs an LEL over-range circuit to protect the sensor. If the unit detects combustible gases in excess of 100% of LEL or 5.0% of CH4, by volume, a high alarm condition is automatically latched and internal circuitry protects the sensor from possible damage. Optional audible/visual or vibrating alarms can be added, if desired, through a jack on the side of the unit.

Alarm and Calibration Overlays for Added Security



All alarm and calibration settings on the LTX310 are adjustable by the user. For added protection in the field, however, settings are changed using three unmarked keys and identified by a removable vinyl overlay. Settings can only be changed after entering a user-defined access code, preventing tampering or accidental resetting.

Easy-To-Read Display

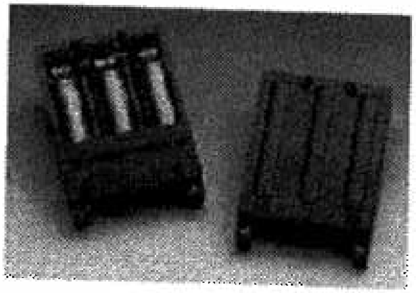
The LTX310 features an easy-to-read LCD display which indicates all gases being monitored. Under low light conditions, a key pad activates backlights, making the unit easy to read under any condition.

Accessories

A complete line of accessories for the LTX310 can be ordered. Calibration equipment is available for all sensors offered. Also prepared by Industrial Scientific is a VHS video cassette for training in the use, calibration and maintenance of theLTX310 Multi-Gas Monitor.

Powered by Rechargeable Battery

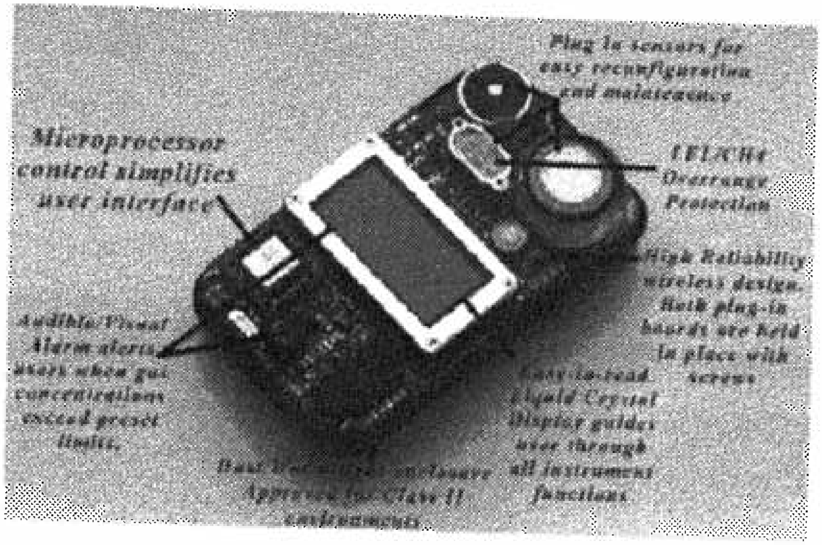
The LTX310 is powered by a rechargeable nickel-cadmium battery that will operate continuously for 10 hours when fully charged. Battery access is simple, so round-the-clock monitoring is easily available by keeping additional battery packs on hand.



Independently Classified Intrinsically Safe for Classes I and II The LTX310 is classified as intrinsically safe by the following agencies: Underwriters Laboratories (UL), Classes I and II; Canadian Standards Association (CSA), Class I; Mine Safety and Health Administration (MSHA), CH4/Air mixtures only.

Microprocessor control simplifies user interface.

Audible/Visual Alarm alerts user when gas concentrations exceed preset limits. Dust/Water-tight enclosure. Approved for Class II environments. Easy-to-read Liquid Crystal Display guides user through all instrument functions. High reliability wireless design. Both plug-in boards are held in place with screws. LEL/CH4 Overrange protection. Plug-in sensors for easy reconfiguration and maintenance.



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Specifications

Case:	Stainless Steel
Dimensions:	4.75 x 2.75 x 1.65 inches (121 x 70 x 42 mm)
Weight:	20.4 ounces (578 grams)
Sensors:	
Combustible Gases/Methane	Catalytic, Diffusion Type
Oxygen and Toxic Gases	Electrochemical
Measuring Range:	
Combustible Gases	0 to 100% LEL in 1% increments
Methane	0 to 5% of volume in .1% increments
Oxygen	0 to 30% of volume in .1% increments
Ammonia	0 to 100 PPM in 1 PPM increments
Carbon Monoxide, Hydrogen Sulfide, Nitric Oxide	0 to 999 PPM in 1 PPM increments Chlorine, Hydrogen Cyanide, Nitrogen Dioxide and Sulfur Dioxide: - 0 to 99.9 PPM in .1 PPM increments
Power Source	Rechargeable nickel-cadmium battery pack
Battery Life:	10 hours per battery charge
Readout	Alpha-numeric liquid crystal display
Temperature Range	Continuous: 5oF to 104oF (-15oC to 40oC)
Intermittent	-4oF to 131oF (-20oC to 55oC)
Humidity Range	15%-90% RH (non-condensing)

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Ordering Information

There are over 50 possible configurations of the LTX310. Listed below are a few of the ones most commonly used. Please contact Industrial Scientific or your local distributor for those not shown.

Part Number	Description
1810-2129-0211	LEL, O2, H2S
1810-2129-0111	LEL, O2, CO
1810-2129-0121	CH4, O2, CO
1810-2129-0011	LEL, O2

Accessories

1810-1816	Single-Unit, Compact Charger
1810-1873	Single-Unit, Dual Rate Charger, 115 VAC
1810-1907	Two-Unit, Dual Rate Charger, 115 VAC
1810-1881	Five-Unit, Dual Rate Charger, 115 VAC
1810-1972	Single-Unit, Dual Rate Charger, 230 VAC
1810-1980	Two-Unit, Dual Rate Charger, 230 VAC
1810-2012	Five-Unit, Dual Rate Charger, 230 VAC
1810-1899	Single-Unit, Dual Rate Charger, 12 VDC
1810-1915	Two-Unit, Dual Rate Charger, 12 VDC
1810-1964	Two-Unit, Trickle Charger, 115 VAC
1810-1998	Five-Unit, Trickle Charger, 115 VAC
1810-2004	Single-Unit, Trickle Charger, 230 VAC
1810-1956	Five-Unit, Trickle Charger, 230 VAC
1810-2137	Twelve-Unit, Trickle Charger, 115 VAC
1810-2156	SP402 Sampling Pump with 10 ft. Hose (UL approved)
1810-2169	SP402 Sampling Pump with 10 ft. Hose (CSA approved)
1810-1857	Hand Pump with 10 ft. Hose
1810-1386	Stainless Steel Extendable Probe
1810-1428	Polycarbonate Probe, 4 ft.
1810-2111	4.5 Folding Probe
1704-1872	Battery Pack, LTX310 (Spare)
1810-2160	Leather Carrying Case for LTX310 (included)
1810-1154	External Alarm
1810-2146	Vibrating Alarm

Calibration Equipment

1810-2165	Cylinder, Cal. Gas, Carbon Monoxide and Methane
1810-1576	Cylinder, Cal. Gas, Carbon Monoxide and Pentane
1810-1584	Cylinder, Cal. Gas, Zero Air
1810-0859	Cylinder, Cal. Gas, 25 PPM Hydrogen Sulfide
1810-1220	Cylinder, Cal. Gas, 10 PPM Sulfur Dioxide
1810-1758	Cylinder, Cal. Gas, 10 PPM Chlorine
1810-1477	Cylinder, Cal. Gas, 25 PPM Nitrogen Dioxide

1810-2151	Cylinder, Cal. Gas, 25 PPM Ammonia
1810-2153	Cylinder, Cal. Gas, 25 PPM Nitric Oxide
1810-2152	Cylinder, Cal. Gas, 10 PPM Hydrogen Cyanide
1810-2155	Flow Regulator with Pressure Gauge for Ammonia
1810-1766	Flow Regulator with Pressure Gauge for all Cylinders except Ammonia 1703-7961 Carrying Case for 2 Cylinders and Regulators
1810-2163	Cylinder, Cal. Gas, 100 PPM Carbon Monoxide

Specifications Subject to Change

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Personal Single Gas Detector

LUMIDOR SAFETY PRODUCTS

The miniature pocket-sized gas detector requires zero maintenance... no battery replacement or calibration over its warranted life of 2 years. The Gas Bug is an inexpensive way to provide personal safety where hazardous levels exist. Hydrogen Sulfide, Oxygen and Carbon Monoxide units available. H2S is the most popular model. (466)

Prod#	Description	1	QTY
GB-1	Gas But, H2S	300.00	☐

Pocket-Sized Gas Monitor/Built-In Pump

LUMIDOR SAFETY PRODUCTS

The MICROMAX monitors combustible gases, O2 and up to 2 toxic gases. Unit has automatic calibration, interchangeable toxic gas sensors, and easy, push button operation. Each unit comes complete with battery charger. Data logging units available--Add "D" to part number and $400.00 to price. (467)

Prod#	Description	1	QTY
MAX-2GP	Monitor, Combustibles & Oxygen	1420.00	☐
MAX-3EP	Monitor, Combustible Gases, Oxygen, H2S	1685.00	☐
MAX-4AP	Monitor, Combustibles, Oxygen, H2S	1895.00	☐

Calibration Kit

LUMIDOR SAFETY PRODUCTS

Calibration Kit is designed to greatly reduce the maintenance cost and labor associated with calibration of Lumidor's Series of multi-gas detectors. This unique Cal-Kit provides a single gas stream containing 25 ppm H2S/N2, 50% LEL methane and 50 ppm CO, and balance care. Kit includes flow regulator, 3 ft tubing, and carrying case. (468)

Prod#	Description	1	QTY
CAL-1C	Kit, Calibration, Single Cylinder	455.00	☐

Alarm Check Gas

LUMIDOR SAFETY PRODUCTS

This accessory is an inexpensive method of checking gas detectors before field use, and is a valid substitution for using expensive calibration gas for daily operational checks. (469)

Prod#	Description	1	QTY
TEST-1A	Gas, Alarm Test	55.00	☐

Add

View Cart

Friday, April 25 1997

Email Webmaster

Lumidor Safety Products
A SafetyTec Company
11221 Interchange Circle South
Miramar, FL 33025
Ph: 800.433.7220
Fax: 954.433.7730

Instrument Division

Permanent Instruments

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MSA's permanent instruments work to protect your working environment by continuous detection of combustible gases, toxic gases, and oxygen and other gases. They are used in many places, including chemical and petrochemical industries, refineries, mining, and offshore and industrial facilities where hazards are present. HVAC and IQ (indoor air quality) systems also use MSA's permanently installed instruments.

Most of our instruments help to protect our customers. Our most popular instruments are: Ultima® Gas Monitor, Toxgard® Monitor, DAN® Data Acquisition Network, FlameGard® Flame Detector, and Safeye Open Path Gas Monitor. They use different technologies for the continuous detection of dangerous toxic or flammable gases. They also range in size from a single sensor in a standalone application to a huge, completely computerized installation, consisting of thousands of sensors monitoring an industrial site.

Indoor environments governed by HVAC (Heating, Ventilation and Air Conditioning) equipment need instruments such as Chillgard® Monitors that detect costly refrigerant gas leaks, for example, from large air-conditioning units in machinery rooms. These instruments help prevent such gases from escaping to the atmosphere and protect people from their toxic effects, while saving money for the building owners. The Models 3600 & 3630 monitor the carbon dioxide levels of many offices buildings, conference centers, and other highly populated buildings, thus insuring a level of quality in the indoor air that we breathe.

Monitoring emissions that could pollute the outdoors can be handled by our Model 8550 and Model 8800 instruments. Their sophisticated gas chromatography or flame ionization technology determines the content of emissions from smoke stacks, hazardous waste sites, and landfills.

If a special requirement is involved, we build turn key, custom systems that exactly fit the need.

Our Products

Here's a list of the major product categories and the instruments we can offer you.
For more information on any product, just click on it.

Safety & Health Gas Monitors

- Models 5300, 5600 & 5800 Multi-Sensor Gas Monitor

- Model 6000 Microprocessor based Multi-Sensor Monitor
- Models 5100 & 5200 Single & Dual Gas Monitors
- Toxgard® Single Gas Monitor
- Computer based Multi-sensor DAN® System
- Model 3800 Infrared Gas Monitor
- Model 4000 Oxygen Analyzer
- Thermal Conductivity Analyzer

Environmental Monitors

- Model 3600 Carbon Dioxide Gas Monitor
- Model 8550 Toxic Gas Analyzer
- Model 1030A Methane/Non-methane Gas Analyzer
- EKHO® Gas Chromatograph

Heating, Ventilation & Air-conditioning (HVAC) Monitors

- Chillgard® Refrigerant Monitors
- Model 3630 Carbon Dioxide Gas Monitor
- TGM® Carbon Monoxide Monitors

Specialized Monitors

- Sensitive and Fast Gas Analysis, FIS tm Field Ion Spectrometry
- Toxgard® SX Gas Monitor
- Total combustible Monitor
- Toxgard® Air-Line Monitor

Process Anaylzers

- Series 8800 Total Hydrocarbon Analyzer
- Lira® Nondispersive Infrared (NDIR) Analyzer

Custom Products & Systems

- Systems
- Custom Products

Sensors & Transmitters

- Ultima® Gas Monitor
- Vantage Point® Infrared Combustible Gas Sensor
- SafEye "Open Path" Gas Detection System
- FlameGard® Flame Detectors

Sampling Systems

- MultiGard tm Gas Sampling System
- Ultima® Sampling Module
- RSS Sample-Draw System

Calibration Systems

- Calibration Kits

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ATTACHMENT B1

GeoTrans, Inc.
A TETRA TECH COMPANY
710 Avis Drive
Ann Arbor, MI 48108
www.geotransinc.com 734-213-2204 FAX 734-213-5008

March 28, 2008

Lawrence Bean
Michigan Department of Environmental Quality – Jackson Office
Waste and Hazardous Materials Division
301 East Louis Glick Highway
Jackson, Michigan 49201

RE: City of Ann Arbor Landfill
Gas Monitoring Plan Revisions

Dear Mr. Bean,

The City of Ann Arbor conducts quarterly gas monitoring surveys to fulfill the requirements of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended and the rules promulgated under Part 115 R 299.4433. Quarterly gas monitoring surveys have been completed for the Ann Arbor landfill (AALF) since April 1997, in accordance with the Landfill Gas Monitoring Program (LGMP) authored by RMT, Inc. of Ann Arbor, Michigan in October 1997 and the subsequent Addendum #1 submitted on October 27, 1997. The LGMP identified 23 sample locations with an additional 12 gas probes proposed for the perimeter of the landfill. These locations are illustrated in the figures located in **Attachment A**. Currently, there are 72 sampling locations monitored quarterly for the AALF as depicted in **Figures 1 and 2** located in **Attachment B**. GeoTrans, Inc. (GeoTrans) personnel have reviewed historical monitoring data at each sample location and are proposing changes to the current gas sampling plan to replace the LGMP from 1997.

Historical data has been compiled in **Table 1** located in **Attachment C** and reviewed. Prior to the installation of the north side methane collection system (system), concentrations of methane were detected in the Southeast Area Park in the following locations: monitoring wells W-84-92, W-85-92; gas probes GP-6SR-99, GP-12-99, GP-13-99; and temporary gas probe TGP-1. On July 19, 2005, the system became operational.

The purpose of this system is to capture methane at the landfill property boundary and prevent off-site migration. There are a total of 10 perimeter extraction wells (PEW) that are designed to capture methane gas through a well screen at the property boundary. The gas is piped back to the system's blower skid, which contains a condensation tank, two 600 pound carbon tanks and a blower. The air from the wells is pushed through a condensation tank where moisture in the air is condensed. The air then travels to the carbon tanks where organic molecules adhere to the granulated active carbon before venting the cleaner air through a stack.

Since the installation of this system, off-site migration has only occurred when the system has been inoperable. When this has occurred, concentrations of methane have been detected in gas probe GP-6SR-99. There has not been a detection of methane in an off-site monitoring location above 0.2 percent methane by volume since the installation of the system, when it is operational.

For a period of time in December 2006 and from January 16, 2007 through March 13, 2007, the system was not operating due to ice build up in the condensation tank that automatically shut the system down. During the time the system was down, weekly monitoring was completed in the Southeast Area Park. Methane was detected in gas probe GP-6SR-99 as high as 17 percent, but methane was not detected in any other monitoring locations.

To resolve the freezing problem, the condensation tank was wrapped with insulation and thermostat-controlled heat tracing material in the spring of 2007. Since mid-March 2007, the system has not had an automatic shut down. A full evaluation of the system was completed in the fall of 2007 by a Landfill Gas Systems Engineer at GeoTrans to ensure the system was functioning optimally and to provide guidance and troubleshooting for operation and maintenance of the system. To service the system monthly, GeoTrans personnel manually shut the system down for approximately 15 minutes. If routine repairs are required, the system is shut down for no longer than 1 hour. Also during the monthly maintenance check on the system, each PEW is monitored for methane, carbon dioxide and lower explosive limit. The flow to each individual PEW is measured and adjusted if necessary. Since the system became operational again in mid-March 2007, there have been no detections of methane in any off-site monitoring locations.

As a result of the effectiveness of this system, GeoTrans is proposing a modification to the current gas monitoring completed quarterly at the AALF on behalf of the City of Ann Arbor. **Figure 3** in **Attachment B** illustrates quarterly, semi-annual and annual monitoring locations. The following gas monitoring plan is requested:

- Quarterly sampling will include 33 on-site monitoring locations including: gas probes GP-1S/1D through GP-5S/5D, GP-7S/7D-99 and GP-8SR-05/GP-8D-98, the former maintenance building and Ann Arbor Drop-Off Station monitoring points MP-1 through MP-13, piezometer P-3U, on-site sanitary sewer locations S1 and S3, on-site stormwater locations R1 and R2 and sentinel temporary gas probe TGP-3. Quarterly event is proposed for January and July.
- Semi-Annual event will include the 33 quarterly monitoring locations plus 12 utility and gas monitoring locations within the Ellsworth Road right of way and Southeast Area Park. This includes the following: sanitary sewer locations S2, S4 and S5, stormwater location R6, water manhole W, meter pit MP, temporary gas probe TGP-1 and gas probes GP-6SR-99, GP-13-99 and GP-14-02 through GP-16-02. Semi-annual sampling is proposed for October.
- Annual event will include the 33 quarterly, 12 semi-annual monitoring locations plus 18 utility, concession building and gas monitoring locations including: stormwater locations R3 through R5, GP-10-99 through GP-12-99 and the 12 monitoring locations in and around the concession building located in Southeast Area Park. Annual event is proposed for April.

This proposed gas monitoring plan consists of 63 monitoring locations. The remaining nine monitoring locations that are currently in the plan include the groundwater monitoring wells located in Southeast Area Park (W-84-92 through W-90-92) and in the residential area north of I-94 (W-93-92 and W-95-92). These groundwater monitoring wells became part of the gas monitoring plan before gas probes were installed in the park and were not intended to be permanent gas monitoring locations.

As part of the revision to the gas monitoring plan, GeoTrans proposes that if the system becomes inoperable or if methane is detected in any off-site monitoring locations, the next set of monitoring points will be monitored. For example, if during a quarterly monitoring event the system is off, both the quarterly and semi-annual locations will be monitored. If the data collected suggests further monitoring is required, the annual locations will also be monitored. Additionally, the groundwater wells located in Southeast Area Park can be monitored if field data indicates methane may be migrating in the direction of one or any of these monitoring wells.

On behalf of the City of Ann Arbor, GeoTrans, Inc. is requesting agreement from the Michigan Department of Environmental Quality (MDEQ) to implement these revisions to the gas sampling plan. If MDEQ concurs, implementation of these revisions will occur with the next quarterly monitoring event at the AALF.

If you have additional questions, please do not hesitate to contact us.

Sincerely,

Patti J McCall　　　　Tammy J. Rabideau

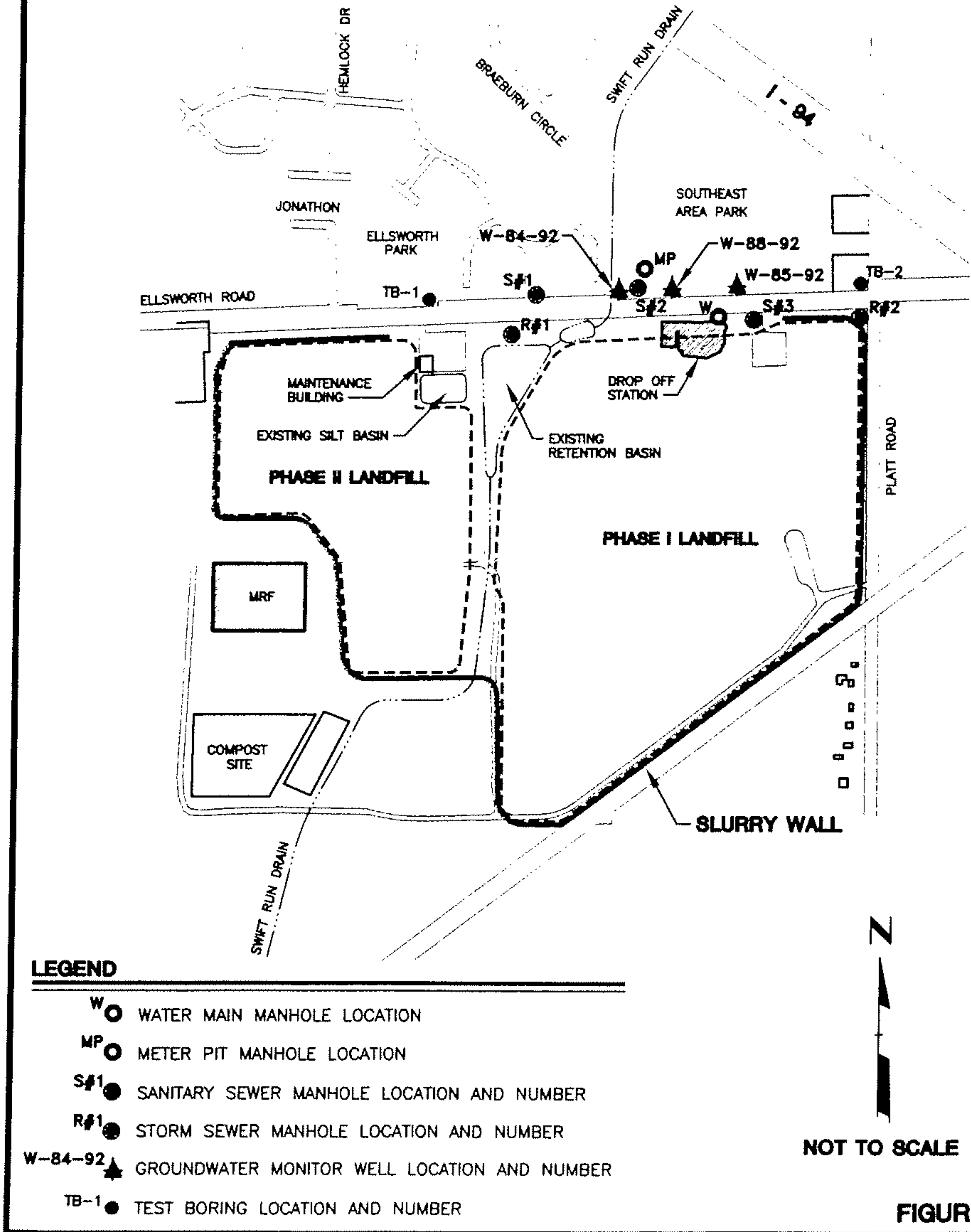
Patti McCall　　　　Tammy Rabideau, CPG
Project Geologist　　　　Senior Hydrogeologist

Attachment A – Landfill Gas Monitoring Program 1997 Figures
Attachment B – Gas Monitoring Plan Figures
Attachment C – Historical Gas Monitoring Data

cc: Matt Naud, Environmental Coordinator; City of Ann Arbor
Anne Warrow, Project Manager; City of Ann Arbor

ATTACHMENT A

Landfill Gas Monitoring Program October 1997 Figures



LEGEND

W ○	WATER MAIN MANHOLE LOCATION
MP ○	METER PIT MANHOLE LOCATION
S#1 ●	SANITARY SEWER MANHOLE LOCATION AND NUMBER
R#1 ●	STORM SEWER MANHOLE LOCATION AND NUMBER
W-84-92 ▲	GROUNDWATER MONITOR WELL LOCATION AND NUMBER
TB-1 ●	TEST BORING LOCATION AND NUMBER

FIGURE 2

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR ENGINEERING DEPARTMENT
ANN ARBOR, MICHIGAN

DRAWN BY:	SJL	PROJ. NO.	4054.02
CHECKED BY:	JTB	FILE NO.	40540207
APPROVED BY:		DATE:	OCTOBER 1997

SITE PLAN AND LANDFILL GAS MONITORING LOCATIONS

RMT INC.

1143 HIGHLAND DRIVE, SUITE B
ANN ARBOR, MI 48108-2237

P.O. BOX 991 48106-0991
PHONE: 313-971-7080

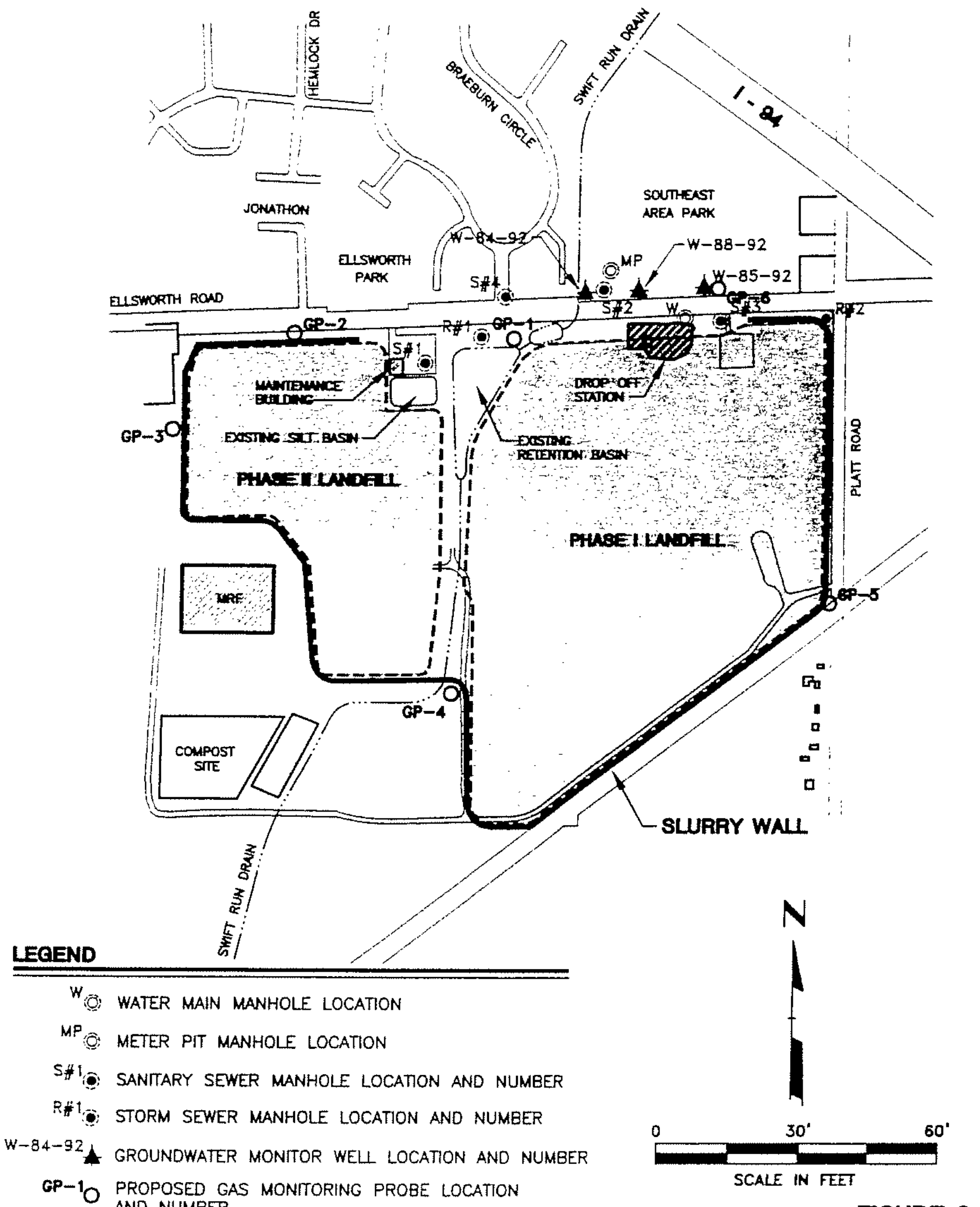


FIGURE 3

CITY OF ANN ARBOR LANDFILL
CITY OF ANN ARBOR ENGINEERING DEPARTMENT
ANN ARBOR, MICHIGAN

DRAWN BY:	SJL	PROJ. NO.	4054.02
CHECKED BY:	JTB	FILE NO.	40540208
APPROVED BY:		DATE:	AUGUST 1997

PROPOSED LANDFILL GAS MONITORING
PROBE LOCATIONS

RMT INC.

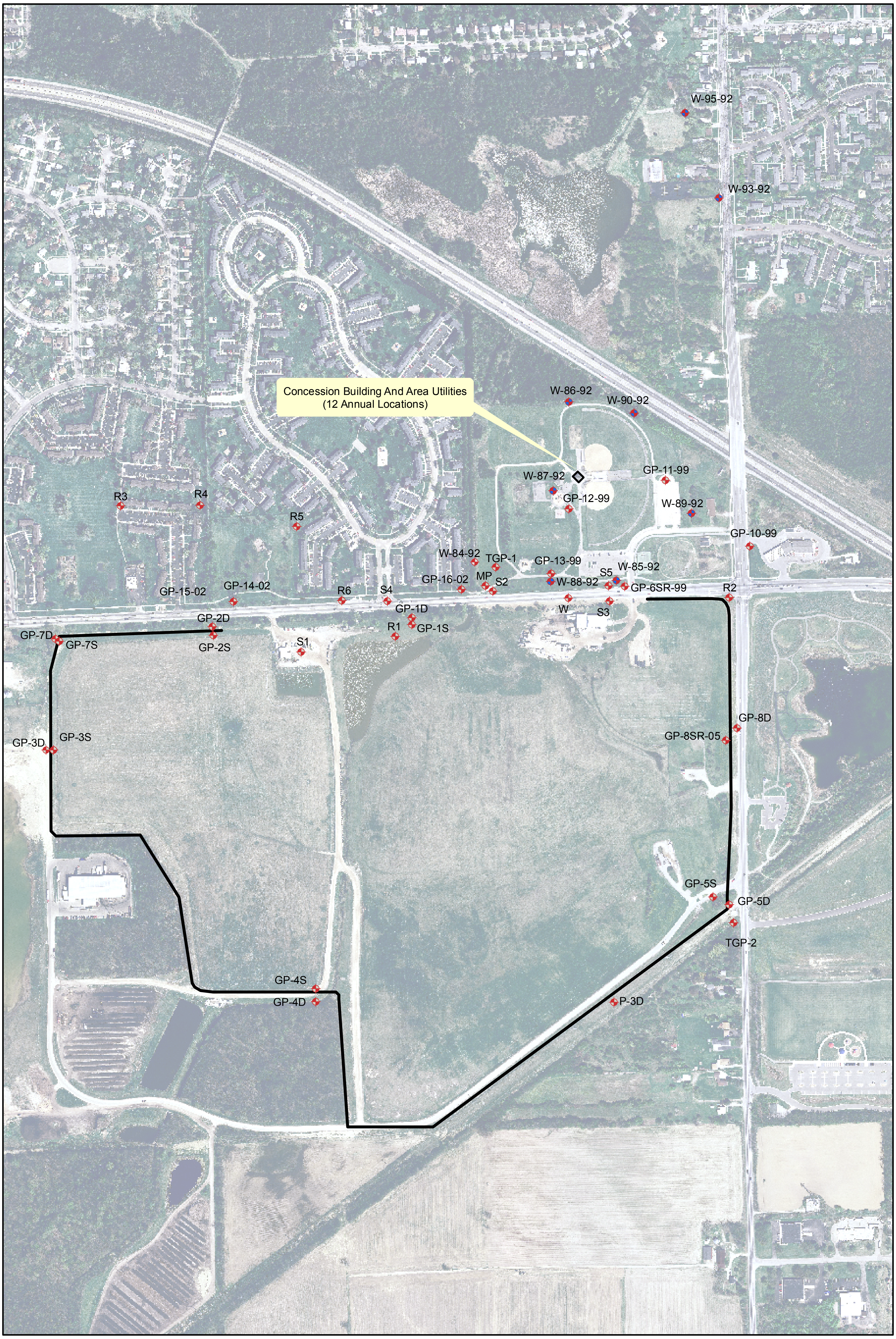
1143 HIGHLAND DRIVE, SUITE B
ANN ARBOR, MI 48108-2237

P.O. BOX 991 48106-0991
PHONE: 313-971-7080

ATTACHMENT B

Gas Monitoring Plan Figures

P:\Projects\Ann Arbor\Landfill\Gas Monitoring\Gas Plan Evaluation\Figure 1_GasWells.mxd



SOURCE: WASHTENAW COUNTY, 2005

🞋	Gas Monitoring
●	Water and Gas Monitoring
—	SlurryWall*

*Slurry Wall Location Is Approximate.
Scale is 1:6000

R1	Storm Sewer Location
S1	Sanitary Sewer Location
GP-1S	Gas Probe Location
TGP-3	Temporary Gas Probe Location
W-84-92	Monitoring Well Location

N

0 250 500 1,000 Feet

GeoTrans, Inc.
A TETRA TECH COMPANY

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

GAS MONITORING LOCATION MAP

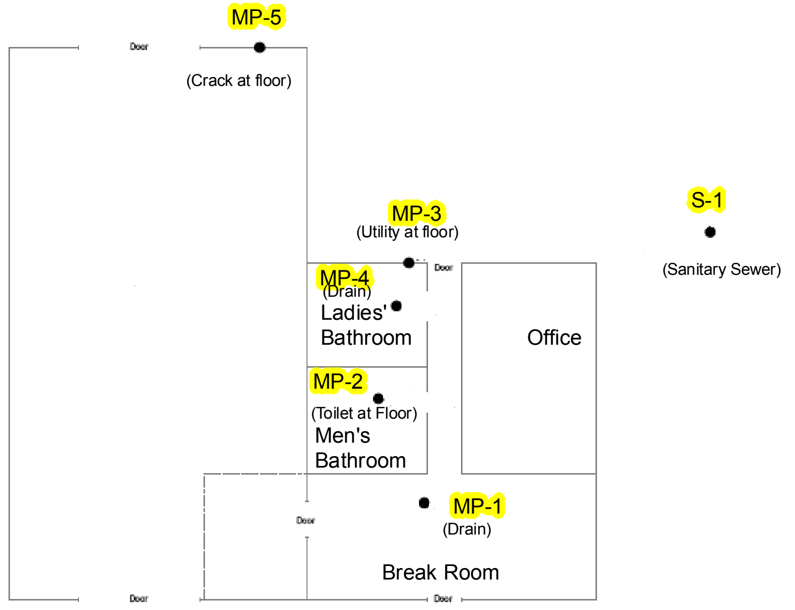
FIGURE

1

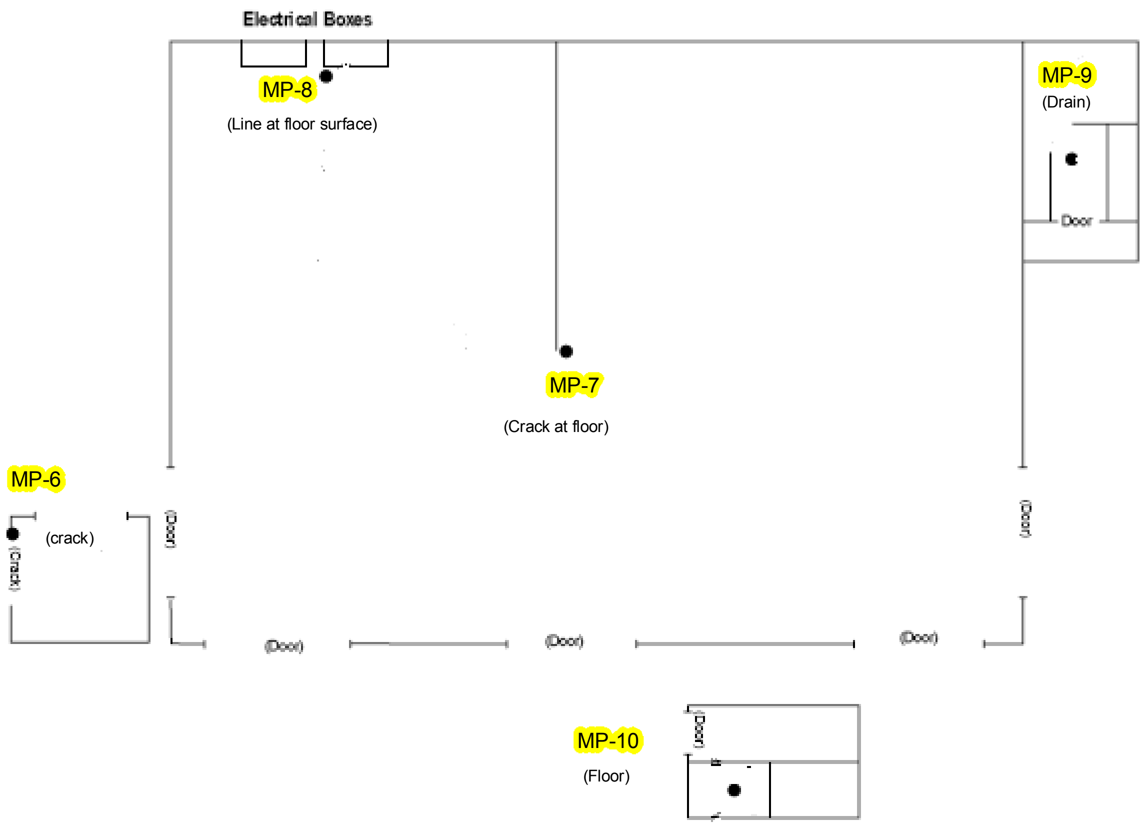
CHECKED: PJM

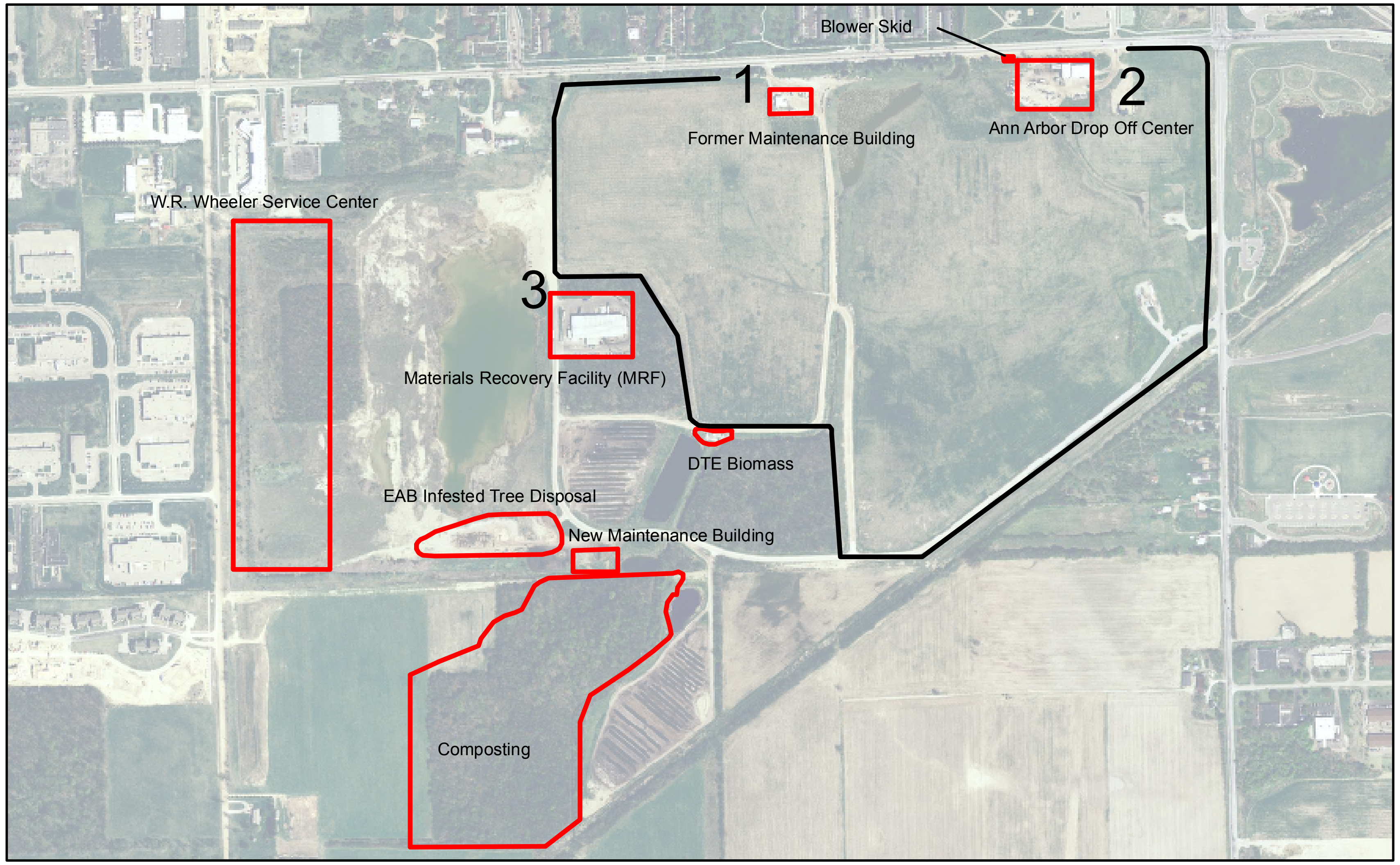
DATE: 2/8/2008

1
Former Maintenance Building



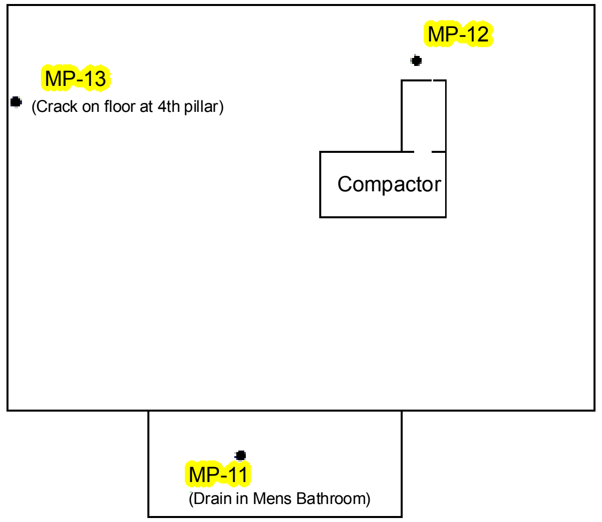
2
Ann Arbor Drop Off Center

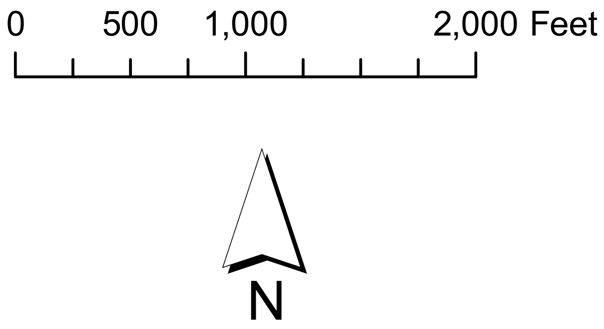




SOURCE: WASHTENAW COUNTY 2005 AERIAL PHOTOGRAPH

3
MRF Building





P:\Projects\Ann ArborLandfill\GIS\Figures\IndoorGasWells_rev

GeoTrans, Inc.
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CHECKED: PJM

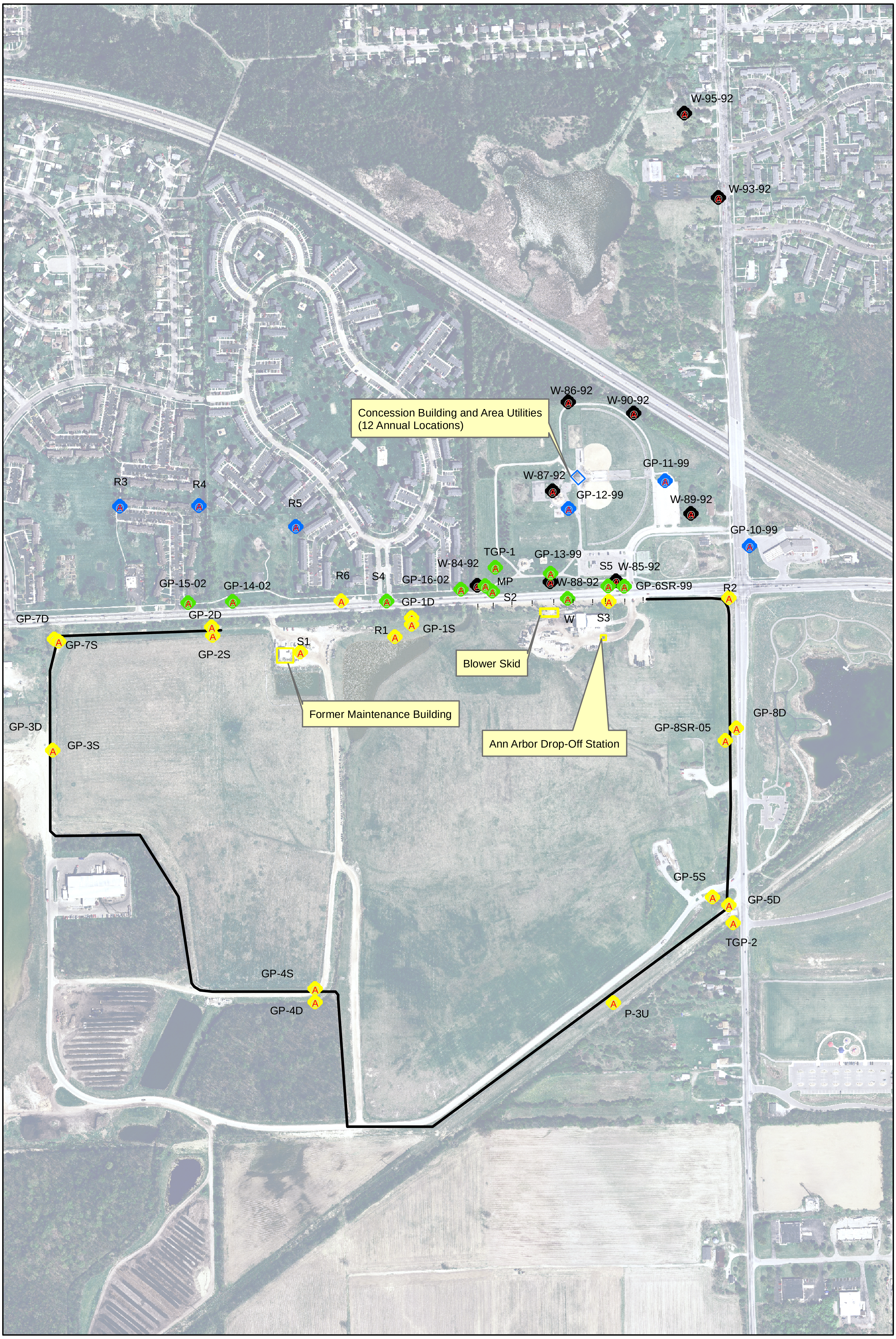
DATE: 3/25/08

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

GAS MONITORING LOCATIONS INSIDE BUILDINGS

FIGURE

2



SOURCE: WASHTENAW COUNTY, 2005

P:\Projects\Ann Arbor\Landfill\Gas Monitoring\Gas Plan Evaluation\Figure 3_ProposedGasMonitoringPlanRevisions.mxd

- ! PEW-1 - PEW-10 Sequentially Numbered West to East
- A Proposed Annual Gas Monitoring Location
- A Water Monitoring Well Proposed For Removal From Gas Monitoring Plan
- A Proposed Quarterly Gas Monitoring Location
- A Proposed Semi-Annual Gas Monitoring Location
- ━ SlurryWall*

R1	Storm Sewer Location
S1	Sanitary Sewer Location
GP-1S	Gas Probe Location
TGP-3	Temporary Gas Probe Location
W-84-92	Monitoring Well Location

0 240 480 960 Feet

*Slurry Wall Location Is Approximate.
Scale is 1:6000

GeoTrans, Inc.
A TETRA TECH COMPANY

CHECKED: PJM
DATE: 3/28/2008

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

PROPOSED GAS MONITORING PLAN REVISON

FIGURE
3

ATTACHMENT C

Historic Gas Monitoring Data

Table 1

Historical Gas Monitoring Data
December 8, 1997 through Janaury 8, 2008

Ann Arbor Landfill
Ann Arbor, Michigan

Sampling Location		December 8, 1997		December 11, 1997		December 15, 1997		February 4, 1998		April 7,1998		July 24,1998		September 30, 1998		29 & 30, 1999		April 14, 1999		July 14, 1999		October 12, 1999		January 18 - 19, 2000		April 28, 2000		July 18,2000	
		Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL
Quarter Sampling Event		**NO**		**NO**		**NO**		**YES**		**YES**		**YES**		**NO**		**NO**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**	
Atmospheric Pressure		NM		NM		NM		NM		NM		NM		NM		NM		26.10 - 30.05 inHg		30.13 inHg		30.04-30.29 inHg		29.85-30.08 inHg		29.91-29.96 inHg		30.04-30.08 inHg	
Maintenance Building	Mon. Pt. 1	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 2	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
	Mon. Pt. 3	NM	NM	NM	NM	NM	NM	0	0	0	0	0	*0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 4	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 5	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 6	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recycling Drop Off Building	Mon. Pt. 7	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 8	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 9	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guard House	Mon. Pt. 10	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRF Building	Mon. Pt. 11	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0-0.2*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 12	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 13	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**	**	0	0	0	0	0	0
Water Main Manhole	W	NM	NM	NM	NM	NM	NM	0	0	0	1	0	1	0	0	NM	NM	0	0	0	0	0	0	0	0	2.5	25	0.2	1
Sanitary Sewer	S1	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S2	NM	NM	NM	NM	NM	NM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S3	NM	NM	NM	NM	NM	NM	0	0	0	1	0.2	1	0	0		0	0	0	0	0	0.7	18	0	0	0	0	0	0
	S4	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2*	0	0	0	0	0	0	0	0
	S5	NM	NM	NM	NM	NM	NM	NM	NM	0	1	0	1	0	0	0	0	0	0	0.6	17	0.3	7	0	0	NM	NM	0	0
Storm Sewer	R1	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	R3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0(f)	0(f)	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0
	R4	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0(f)	0(f)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0(f)	0(f)	0	0	0	0	0	0	0	*1-0	0	0	0	0	0	0	0	0
	R6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0(f)	0(f)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Meter Pit Manhole	MP	NM	NM	NM	NM	NM	NM	0	0	0.2	1	0.2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring Wells	W-84-92	0	0	NM	NM	NM	NM	**20**	**>100**	**15**	**>100**	**27**	**>100**	**17**	**>100**	0.5	6	1.7	25	0.8	17	1.6	>100	5	**>100**	3.4	34	5	**>100**
	W-85-92	NM	NM	NM	NM	NM	NM	0	0	0 (c)	0 (c)	0	0	0	0	0	0	0	0	2.8	73	**10**	**>100**	0.2	6	**14**	**>100**	**26**	**>100**
	W-86-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	1.3	22	0.3	0	0.7	14	0	0	0	0	0.2	0	0	0	0	0
	W-87-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	1.2	17	0	0	0	0	0.2	0	0	0	0.4	9	0	0	0	0
	W-88-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	W-89-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	W-90-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.2	0	0.1	1.2*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	W-93-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0.2	0-1*	0	0	0	0	0	0
	W-95-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	1	0	0	NM	NM	0	0	0	0	0	0
Gas Probe	GP-1S	NM	NM	NM	NM	NM	NM	0	0	0.6	1	0.2	0	0	0-1*	0.2	0	0.2	0	0.4	0	0.2	0	0	0	0	0	0	0
	GP-1D	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0-1*	0.2	0	0	0	0.2	0	0	0	0	4	0	0	0.2	0
	GP-2S	NM	NM	**12**	**>100**	**12**	**>100**	**3.4**	**44**	3	50	**36**	**>100**	**56**	**>100**	**6**	**>100**	0.3	0	**31**	**>100**	**40**	**>100**	3.7	>100	0	0	1.2	12
	GP-2D	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	NM	NM	0	0	0	0
	GP-3S	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM	NA	NA	0	0	0	4	0	0	0	0
	GP-3D	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0.2	0	0	0	0.2	0	0.2	0	0	0	0	0	0.2	0	0	0
	GP-4S	NM	NM	0	0	NM	NM	0	0	0	0	0	0	0.2	2	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0
	GP-4D	NM	NM	0	0	NM	NM	0	0	0.3	1	0.4	11	0.3	1	0.2	0	0.2	0	1.1	8	1.1	0	0.2	0	0.2	0	0.2	0
	GP-5S	NM	NM	**5**	**>100**	**5**	**>100**	**6**	**>100**	4.3 (d)	-14 (d)	2.2	32	1.8	16	1.1	8	0.6	5	0	0	0.4	3	0.2	0	0	0	0.2	0
	GP-5D	NM	NM	**5**	**>100**	**5**	**>100**	4.9	88	2.4	35	0.6	2	0.7	12	0	0	0	3	0	0	0.2	1	0	0	0	0	0	0
	GP-6SR-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	3.3	92	**17**	**>100**	**56**	**>100**
	GP-7S-98	NI	NI	NI	NI	NI	NI	0	0	0	0	0	0	0.2	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0.2	0
	GP-7D-98	NI	NI	NI	NI	NI	NI	0	0	0.2	1	0	*0 - 1.0	0	2	0.2	0	0.2	0	0.2	0	0	0	0	0	0	0	0	0
	GP-8SR-05	NI	NI	NI	NI	NI	NI	**10**	**>100**	**9**	**>100**	**8**	**>100**	**9**	**>100**	**7**	**>100**	**6**	**>100**	5	>100	1.3	20	1.6	43	1.1	7	0.5	5
	GP-8D-98	NI	NI	NI	NI	NI	NI	**5**	**>100**	**10**	**>100**	**8**	**>100**	**7**	**>100**	**6**	**>100**	4.8	>100	1.4	78	3.2	49	1.9	46	1.1	7	0.8	4
	GP-10-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NM	NM	0.2	0	0.2	0	0.3	0
	GP-11-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NM	NM	0.2	0	0	0	0	0
	GP-12-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NM	NM	0.2	0	0.3	0	**45**	**>100**
	GP-13-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NM	NM	**19**	**>100**	**28**	**>100**	**34**	**>100**
	GP-14-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-15-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-16-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Temporary Gas Probes	TGP-1	**12 - 33 (b)**	**>100**	0 (a)	0 (a)	0 (a)	0 (a)	**16**	**>100**	**15**	**>100**	0	0	**31**	**>100**	**9**	**>100**	0.2	0	**24**	**>100**	**14**	**>100**	**9**	**>100**	**9**	**>100**	**9**	**>100**
	TGP-2	0	0	0	0	0.5	10	0.2	0	0 (c)	1 (c)	0	0	0.2	1-2*	0	0	0	0	0	0	0.2	0-1*	0	0	0	0	0	0
	TGP-3/P-3D*	0.2	4	0	0	0.35	7	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0-1*	0	0	0	0	0	0
Bathroom Building	Men's	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Women's	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

Notes:

(a) After installation on 12/8/97, TGP-1 was left uncapped to vent. Readings on 12/10/97 and 12/15/97 were taken while the probe was uncapped. On 12/15/97, the gas probe was recapped. On 12/19/97, TGP-1 was sampled after being capped for 4-days.

(b) On December 8, 1997, readings in TGP-1 ranged between 12 to 33-percent methane by volume.

(c) Readings recorded on April 20, 1998.

(d) Readings recorded on April 21, 1998.

(e) Unable to locate monitoring point.

NM = Not measured; NA = Not Accessible; NI = Not Installed

% = Percent; LEL = Lower Explosive Limit; in Hg = Inches of Mercury

Yellow shading indicates an action required per the City of Ann Arbor Landfill Gas Monitoring Plan and Addendum:

Blue shading indicates the day the North side methane collection system became operational.

Green shading any detection of methane after the installation of the methane collection system.

* TGP-3 was damaged in July 2007. MDEQ approved abandonment of TGP-3 and quarterly monitoring of P-3U in a letter dated January 11, 2008.

^ Readings extending two inches above the floor of the Ann Arbor Drop-Off Station to the breathing space measured 0% methane by volume.
The reading could not be reproduced the next day and is likely due to the low pressure system.

Table 1

Historical Gas Monitoring Data
December 8, 1997 through Janaury 8, 2008

Ann Arbor Landfill
Ann Arbor, Michigan

Sampling Location		November 3,2000		January 16,2001		April 24,2001		July 17,2001		October 24,2001		January 15 - 18, 2002		April 15, 2002		July 25, 2002		October 11, 2002		January 17,2003		April 25, 2003		July 17, 2003		October 20, 2003		January 28 & 29, 2004		April 05, 2004	
		Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	Percent of Methane by Volume	Percent of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Quarter Sampling Event		YES		YES		YES		YES		YES		YES		YES		YES		YES		YES		YES		YES		YES		YES		YES	
Atmospheric Pressure		NM		30.06 to 30.11 in Hg		30.07 to 30.17 in Hg		29.98 to 30.02 in Hg		30.14		29.71 to 30.18 in Hg		29.83 in Hg		30.06 to 30.15 in Hg		30.12 to 30.18 in Hg		30.09 to 30.18 in Hg		29.8 in Hg		29.8 in Hg		30.00 in Hg		29.95 to 30.12 in Hg		30.17 to 30.21 in Hg	
Maintenance Building	Mon. Pt. 1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
	Mon. Pt. 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	2	0	0	-0.2	0-1*	0	0	0.2	0	0	0	0	0	0	0
Recycling Drop Off Building	Mon. Pt. 7	0	0	0-0.2	1	-0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0-1*	0.2	1	0.2	0	0	0	0	0	0	0
	Mon. Pt. 8	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0-1*	0.2	0	0.2	0	0	0	0	0	0	0
	Mon. Pt. 9	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0-1*	0	0	0.2	0	0	0	0	0	0	0
Guard House	Mon. Pt. 10	0	0	0-0.2	1	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0-1*	0.2	0	0.2	0	0	0	0	0	0	0
MRF Building	Mon. Pt. 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2	0	0	0	0	0	0	0
	Mon. Pt. 13	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Main Manhole	W	0	0	0	0	0	0	0	0	0.8	22	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Sanitary Sewer	S1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3	0	0	0.2	0	0	0	0	0	0	2	0	1
	S2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0-1*	0	0	0	3	0	0	0	0	0	0
	S3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	NA	NA	0	0
	S4	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0.2	1	0	0	0	0	0	0
	S5	NM	NM	NM	NM	0	0	NM	NM	0	0	0	0	0	0	0	1	0	0	NA	NA	0	0	0	0	0	0	NA	NA	0	0
Storm Sewer	R1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	0	0
	R2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	NA	NA	0	0
	R3	0	0	0	1	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0-1*	0	0	0	0	0	0	0	0	0	0
	R6	0	0	0	0	-0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Meter Pit Manhole	MP	0	0	0	0	-0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-0.2	0	0	0	0	0	0	0
Groundwater Monitoring Wells	W-84-92	**31**	**>100**	**5**	**>100**	0	1	**14**	**>100**	**9**	**>100**	0.2	11	**9**	**>100**	1.8	60	4	83	**5**	**>100**	13	0	2.5	42	**13**	**>100**	0	0	**9**	**>100**
	W-85-92	0	0	**4**	**>100**	-0.2	1	0	0	0.2	4	0.2	0	0	0	0	1	0	1	0	1	0	1	**24**	**>100**	0.2	0	0	0	0	0
	W-86-92	0.3	0	0	0	NM	NM	3	81	1.3	24	0	0	0	1	0.2	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	W-87-92	1.3	36	1.9	57	NM	NM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	0	0	0	0	0	0	0	0	0
	W-88-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	W-89-92	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0.2	0	0	0	0	0	0	0	0	0
	W-90-92	0.2	1	0	0	NM	NM	0	0	0	0	0	1	0	0	0.2	0	0.2	0	0	0	0	0	0	1	0	0	0	0	0	0
	W-93-92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	0	-0.2	1	0.2	0	0.2	0	0.2	0	0.2	1	0.2	1
	W-95-92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	1	0	0	0	0	0	0	0.2	2	0	1
Gas Probe	GP-1S	0.2	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0.2	0	0	2	0	0-1*	0.3	1	0.2	1	0	0	0	0	0	0
	GP-1D	0	0	0	0	0	0	0	0	0.2	0	0	1	0	1	0.2	0	0.2	1	0	0	0.2	0	0.3	0	0	0	0	0	0	0
	GP-2S	**13**	**>100**	2.1	76	0.6	23	**6**	**>100**	**11**	**>100**	**8**	**>100**	0.3	13	**18**	**>100**	**17**	**>100**	**5**	**>100**	0	0	**14**	**>100**	**11**	**>100**	0.5	35	0.2	3
	GP-2D	0	0	0	0	0	0	**22/0.3***	**>100**	0.2	0	0	0	0	1	0	2	0	0	0.9	1+	0	0	0	0	0	2	0	0	0	0
	GP-3S	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	0	0	1	0	0-1*	0.2	3	0	1	0.2	1	0	0	0	2
	GP-3D	0	0	0	0	0	0	0	0	0.2	0	0	1	0	0	0	0	0	1	0	2	0	0	0	1	0	0	0	0	0	1
	GP-4S	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	2	0.2	2
	GP-4D	0.2	0	0.2	3	0	3	0.4	3	0	0	0	4	0	0	0.3	0	0	0	0.2	1	0.2	0	0	0	0	0	0	3	0.2	2
	GP-5S	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	0	0	0	0	1
	GP-5D	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0.2	0	0	0	0	0
	GP-6SR-99	0.2	0	**15**	**>100**	0.2	4	0	0	4	79	0	0	0	0	0.2	1	0.3	0	0.2	0	0.3	1	**60**	**>100**	0.2	2	0.2	0	0	0
	GP-7S-98	0	0	0	0	0	0	0.3	0	0.2	0	0.2	1	0.2	0	0.2	0	0	0	1	0	0.2	1	0.3	1	0.2	0	0	0	0	1
	GP-7D-98	0	0	0	0	0	0	0.2	0	0.2	0	0	1	0	0	0.2	0	0.2	1	0	1	0.2	1	0	0	0.2	1	0	0	0	1
	GP-8SR-05	0.4	7	0	3	0	1	0.4	0	0	-1	0	1	0.3	0	0.2	0	0.3	1	0	0-1*	0.2	0	0.4	-1	0.3	0	NA	NA	NA	NA
	GP-8D-98	0.6	10	0	2	0	0	0.2	0	0	-1	0	2	0.2	1	0.3	0	0.2	-1	0	0	0.2	0	0.3	1	0.2	1	NA	NA	0.3	3
	GP-10-99	0.2	0	0.2	0	0.2	0	0.2	0	0	0	0.2	1	0.2	0	0	0	0	0	0	1	0.2	1	0.2	>100	0.2	0	0.2	1	0.2	1
	GP-11-99	0	0	0	0	NM	NM	0	0	0	0	0	2	0	1	0	0	0.2	0	0.2	1	0.2	1	0	0	0.2	0	0	0	0.2	1
	GP-12-99	**6**	**>100**	1.8	62	NM	NM	0.2	0	0	0	NM	NM	0	0	0.2	1	0	0	0	0-1*	0	0	0	0	0	0	0	0	0.2	1
	GP-13-99	**15**	**>100**	0	0	0.2	1	0.2	0	1.1	17	1.7	49	0	1	0.2	0	0.2	1	0	0	0	0	**26**	**>100**	**5**	**>100**	0	0	0	0
	GP-14-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	1	0.2	0	0.2	1	0	0	0	0	0	0
	GP-15-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	0	0.2	0	0	1	0	0	0	0	0	0
	GP-16-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0.3	10	0	0	0	0	0	0	0	0	0.2	1
Temporary Gas Probes	TGP-1	0	0	0	0	NM	NM	0	0	0.2	2	1.2	50	2	63	0.5	15	0	0	NA	NA	0.6	7	0	0	0	0	0	0	0	0
	TGP-2	0.2	0	0.2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.2	1	0	1	0.2	0	0	0	0	2	0	1
	TGP-3/P-3D*	0.2	0	0	0	0	0	0	0	0.2	0	0	0	0	1	0.2	0	0	0	0	2	0	1	0	0	0	0	0	0	0.2	1
Bathroom Building	Men's	0	0	0	0	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0-1*	0	0	0	0	0	0	0	0	0	0
	Women's	0	0	0	0	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0-1*	0	0	0	0	0	0	0	0	0	0

Notes:

(a) After installation on 12/8/97, TGP-1 was left uncapped to vent. Readings on 12/10/97 and 12/15/97 were taken while the probe was uncapped. On 12/15/97, the gas probe was recapped. On 12/19/97, TGP-1 was sampled after being capped for 4-days.

(b) On December 8, 1997, readings in TGP-1 ranged between 12 to 33-percent methane by volume.

(c) Readings recorded on April 20, 1998.

(d) Readings recorded on April 21, 1998.

(e) Unable to locate monitoring point.

NM = Not measured; NA = Not Accessible; NI = Not Installed

% = Percent; LEL = Lower Explosive Limit; in Hg = Inches of Mercury

Yellow shading indicates an action required per the City of Ann Arbor Landfill Gas Monitoring Plan and Addendum:

Blue shading indicates the day the North side methane collection system became operational.

Green shading any detection of methane after the installation of the methane collection system.

* TGP-3 was damaged in July 2007. MDEQ approved abandonment of TGP-3 and quarterly sampling of P-3U in a letter dated January 11, 2008.

^ Readings extending two inches above the floor of the Ann Arbor Drop-Off Station to the breathing space measured 0% methane by volume.
The reading could not be reproduced the next day and is likely due to the low pressure system.

Table 1

Historical Gas Monitoring Data
December 8, 1997 through Janaury 8, 2008

Ann Arbor Landfill
Ann Arbor, Michigan

Sampling Location		July 29, 2004		October 18, 2004		January 10, 2005		April 04, 2005		July 19, 2005		October 17, 2005		January 10, 2006		April 17, 2006		July 18, 2006		October 23, 2006		January 03, 2007		April 03, 2007		July 17, 2007		October 02, 2007		January 08, 2008	
		% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Quarter Sampling Event		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**		**YES**	
Atmospheric Pressure		30.06 to 30.07 in Hg		29.94 to 30.08 in Hg		30.20 to 30.27 in Hg		30.20 to 30.27 in Hg		29.98 to 30.01 in Hg		29.79 to 30.01 in Hg		30.26 to 30.43 in Hg		29.86 to 29.89 in Hg		30.04 to 30.08 in Hg		29.93 to 29.96 in Hg		30.11 to 30.20 in Hg		29.87 to 30.05 in Hg		29.92 to 30.00 in Hg		30.04 to 30.12 in Hg		29.63 to 29.79 in Hg	
Maintenance Building	Mon. Pt. 1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 2	0	0	0	0	-0.2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 3	0	0	0	0	-0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 4	0	0	0	0	0	0	0	1	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recycling Drop Off Building	Mon. Pt. 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	**11^**	**over^**
	Mon. Pt. 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 9	-0.7	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guard House	Mon. Pt. 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRF Building	Mon. Pt. 11	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 12	0	0	0	0	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0
	Mon. Pt. 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0
Water Main Manhole	W	0	0	0	0	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0
Sanitary Sewer	S1	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	S2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S3	0	0	0	0	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S4	0	0	0	0	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S5	0	0	0	0	NA	NA	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Storm Sewer	R1	0	0	0	0	0	0	0	2	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	0	0	0	0	0	0	0	0	-0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R6	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA
Water Meter Pit Manhole	MP	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring Wells	W-84-92	4.9	>100	**10**	**>100**	**9**	**>100**	**11**	**>100**	**8**	**>100**	0	0	0	0	0	0	0.2	1	0	0	0	1	0	0	0	0	0	0	0	0
	W-85-92	0	0	0	0	-0.2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	W-86-92	0	1	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	W-87-92	0	1	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0
	W-88-92	NM	NM	NM	NM	NM	NM	1.4	42	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	W-89-92	0	0	0	0	0	0	0	0	0.2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	W-90-92	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
	W-93-92	0	0	0.2	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	W-95-92	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas Probe	GP-1S	0	0	0.2	1	0	0	0	2	0	0	0.2	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
	GP-1D	0	0	0	0	0	0	0	2	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-2S	**13**	**>100**	**6**	**>100**	3.4	>100	0.2	3	4.2	>100	**26**	**>100**	2.5	>100	0.2	1	**13**	**>100**	**12**	**>100**	0.6	16	0	1	**31.5**	**>100**	**25.1**	**>100**	**1.5**	**29**
	GP-2D	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0
	GP-3S	0	0	0	0	0	2	0.1	2	0	1	0	0	0	0	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0
	GP-3D	0	0	0	1	0	1	0.3	2	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0
	GP-4S	0.2	1	0	0	0.2	0	0	0	0	0	0.2	1	0	0	0.2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4D	0	0	0	0	0.2	1	0.2	5	0	0	0.2	2	0	0	0.3	3	0	2	0	1	0	3	0	2	0	0	0	0	0	0
	GP-5S	0	0	0.3	1	0	0	0	2	0	1	0.2	0	0	0	0.3	2	0.2	0	0	0	0	2	0	2	0	0	0	0	0	0
	GP-5D	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0.2	0	0	0	0	2	0	2	0	0	0	0	0	0
	GP-6SR-99	0	0	0	0	0.3	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-7S-98	0	0	0	1	0	1	0.3	2	0	1	0	0	0	0	0	0	0	1	0	0	0	3	0	2	0	0	0	0	0	0
	GP-7D-98	0	0	0	1	0.2	1	0.3	2	0	1	2	0	0	0	0	0	0	1	0	0	0	3	0	1	0	0	0	0	0	0
	GP-8SR-05	NA	NA	NA	NA	NA	NA	0	2	0.2	1	0	0	0.3	0	0	0	0	1	0	0	0	2	0	2	0	0	0	0	0	0
	GP-8D-98	0	0	0.3	0	0	0	0.2	2	0.2	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0
	GP-10-99	0.2	0	0.3	0	0.2	0	0	2	0.2	0	0.2	0	0.2	1	0.2	2	0	0	0	0	0	3	0	2	0	0	0	0	0	0
	GP-11-99	0	1	0	0	0	1	0	1	0.3	1	0	1	0	0	0.2	1	0	1	0	0	0	2	0	0	0	0	0	0	0	0
	GP-12-99	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
	GP-13-99	**11**	**>100**	4.3	>100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
	GP-14-02	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
	GP-15-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-16-02	0	0	0	1	0.2	1	0	0	0	0	0.2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Temporary Gas Probes	TGP-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	2	0	0	0	0	0	0
	TGP-2	0	0	0.2	1	0	1	0	2	0	1	0	0	0	0	0.2	2	0	0	0	0	0	1	0	2	0	0	0	0	0	0
	TGP-3/P-3D*	0	0	0	1	0	1	0	2	0	1	0.2	1	0	0	0	0	0	0	0	0	0	1	0	2	NA	NA	NA	NA	0	0
Bathroom Building	Men's	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Women's	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:
(a) After installation on 12/8/97, TGP-1 was left uncapped to vent. Readings on 12/10/97 and 12/15/97 were taken while the probe was uncapped. On 12/15/97, the gas probe was recapped. On 12/19/97, TGP-1 was sampled after being capped for 4-days.
(b) On December 8, 1997, readings in TGP-1 ranged between 12 to 33-percent methane by volume.
(c) Readings recorded on April 20, 1998.
(d) Readings recorded on April 21, 1998.
(e) Unable to locate monitoring point.
NM = Not measured; NA = Not Accessible; NI = Not Installed
% = Percent; LEL = Lower Explosive Limit; in Hg = Inches of Mercury
Yellow shading indicates an action required per the City of Ann Arbor Landfill Gas Monitoring Plan and Addendum:
Blue shading indicates the day the North side methane collection system became operational.
Green shading any detection of methane after the installation of the methane collection system.
* TGP-3 was damaged in July 2007. MDEQ approved abandonment of TGP-3 and quarterly monitoring of P-3U in a letter dated January 11, 2008.
^ Readings extending two inches above the floor of the Ann Arbor Drop-Off Station to the breathing space measured 0% methane by volume.
The reading could not be reproduced the next day and is likely due to the low pressure system.

ATTACHMENT B2

GeoTrans, Inc.
A TETRA TECH COMPANY
710 Avis Drive
Ann Arbor, MI 48108
www.geotransinc.com
734-213-2204 FAX 734-213-5008

May 1, 2008

Lawrence Bean
Michigan Department of Environmental Quality – Jackson Office
Waste and Hazardous Materials Division
301 East Louis Glick Highway
Jackson, Michigan 49201

RE: City of Ann Arbor Landfill
Addendum to Gas Monitoring Plan Revisions letter

Dear Mr. Bean,

This letter is to serve as an addendum to the proposed Gas Plan Revision letter dated March 28, 2008. As a follow-up to our conversation on April 23, 2008, the Waste Transfer Station (WTS) located in the Ann Arbor Landfill (AALF) will be included in the quarterly gas monitoring plan. The location of the WTS has been added to the revised Figure 2.

On April 24, 2008 GeoTrans personnel were on-site to investigate the location of floor drains and cracks in the WTS. Particular attention was paid to the closed office space located within the building. There are no obvious cracks in the floor or the wall of the office space. A floor drain is located in the bathroom at the west end of the office. The utility closet, accessed on the north from inside the main garage also has a floor drain. As these are potential methane migration points, they will become monitoring points MP-14 and MP-15 in the quarterly gas sampling plan, bringing the total number of quarterly monitoring locations to 35.

The majority of the WTS is open to the east where waste haulers enter to unload trash. One large floor grate extends across the floor. The ramp, located on the north side of the building has large floor grates on both the east and west ends. As this portion of the building is open and well ventilated, these drains will not be part of the gas sampling plan. However, if methane is ever detected in MP-14 or MP-15, these grates will be checked as potential migration pathways.

If you have additional questions, please do not hesitate to contact us.

Sincerely,

Patti J McCall　　　　Tammy J. Rabideau

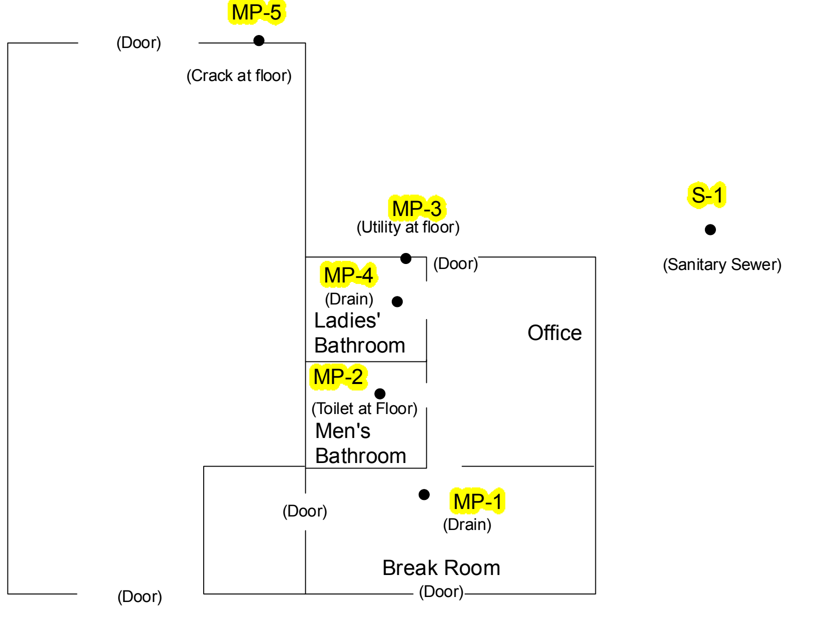
Patti McCall
Project Geologist

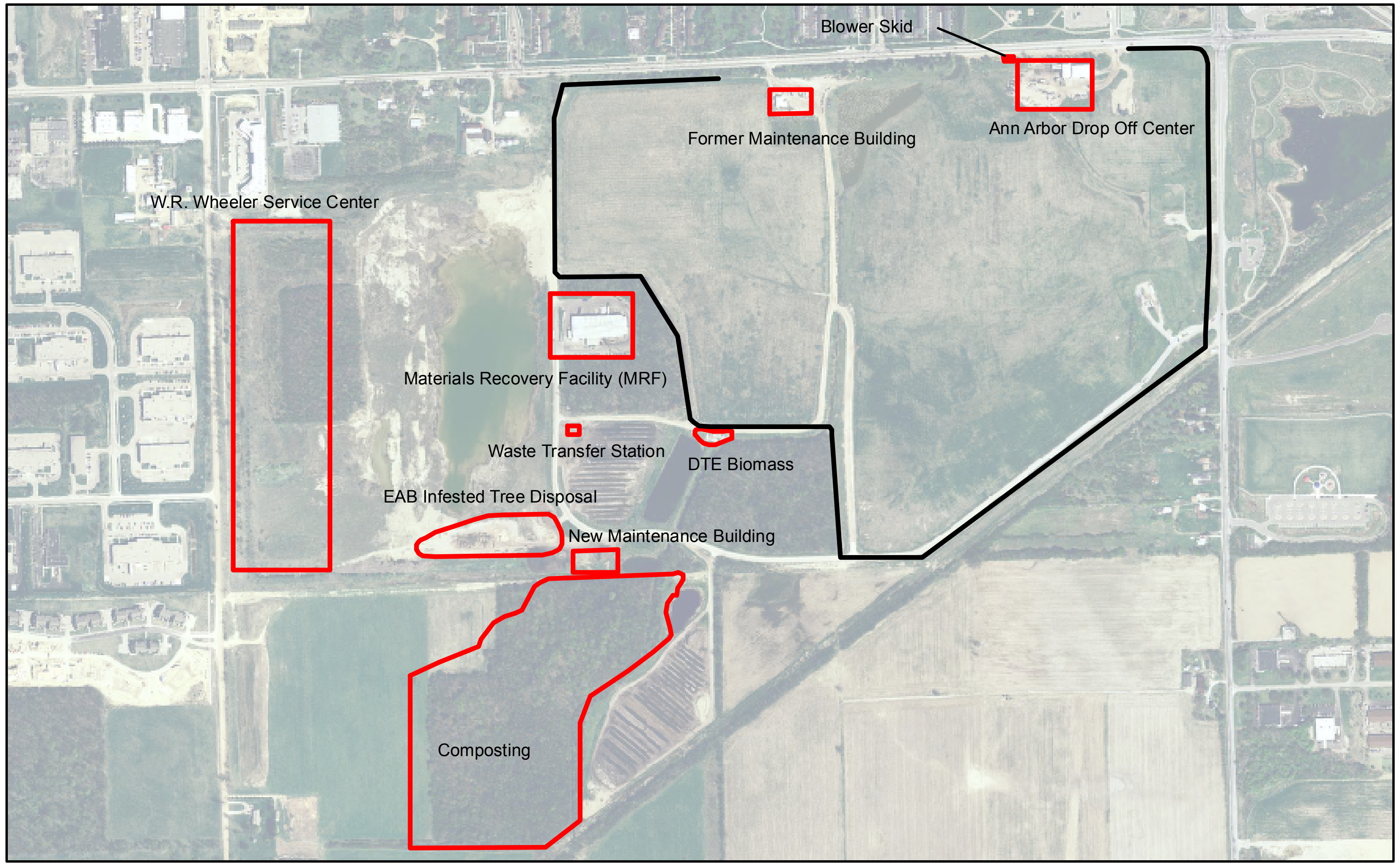
Tammy Rabideau, CPG
Senior Hydrogeologist

Attachment A – Revised Figure 2 Gas Monitoring Locations Inside Buildings

cc: Matt Naud, Environmental Coordinator; City of Ann Arbor
Anne Warrow, Project Manager; City of Ann Arbor

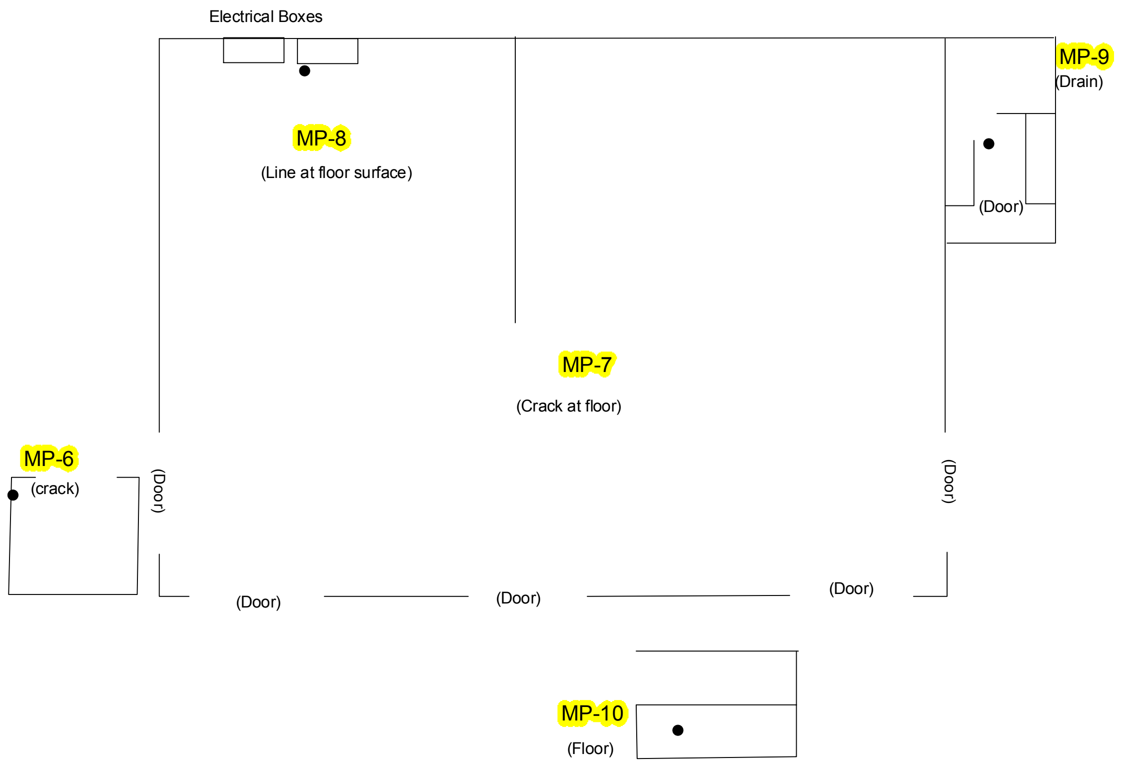
Former Maintenance Building



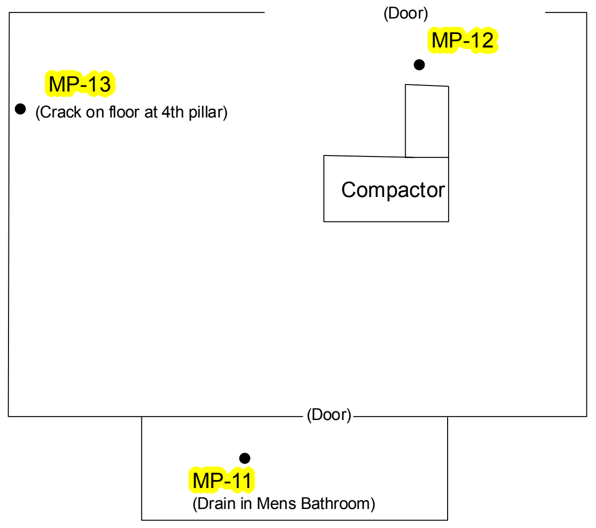


SOURCE: WASHTENAW COUNTY 2005 AERIAL PHOTOGRAPH

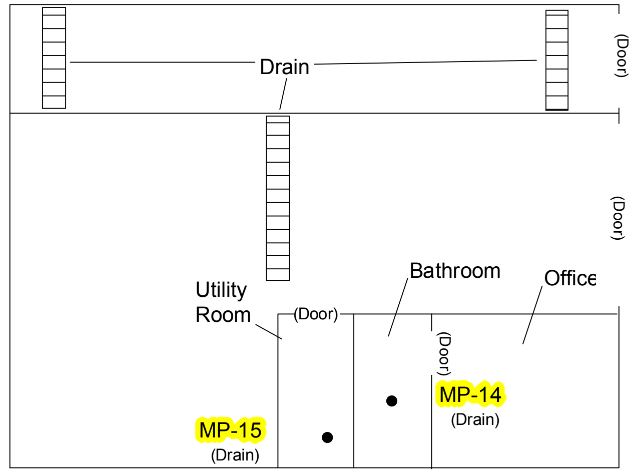
Ann Arbor Drop Off Center



MRF Building



Waste Transfer Station



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GeoTrans, Inc.
A TETRA TECH COMPANY

CHECKED: PJM
DATE: 3/25/08

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

GAS MONITORING LOCATIONS INSIDE BUILDINGS

FIGURE
2

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
JACKSON DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

June 16, 2008

Mr. Matt Naud
Ann Arbor Landfill
City of Ann Arbor
100 North Fifth Avenue
Ann Arbor, Michigan 48104

Dear Mr. Naud:

SUBJECT: Gas Monitoring Plan Revisions and Addendum to Gas Monitoring Plan Revisions
City of Ann Arbor Landfill
4150 Platt Road Ann Arbor, Michigan 48108
Facility Number 399487

The Department of Environmental Quality (DEQ), Waste and Hazardous Materials Division (WHMD) has reviewed the Gas Monitoring Plan Revisions dated March 28, 2008, and the Addendum to Gas Monitoring Plan Revisions letter dated May 1, 2008, for the City of Ann Arbor Landfill prepared by Geo Trans, Inc. This review was conducted pursuant to Part 115, Solid Waste Management, Michigan Compiled Laws 324.11501 et seq. of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and any administrative rules promulgated pursuant to this act. Based on that review, the WHMD has determined that the Gas Monitoring Plan Revisions dated March 28, 2008, and the Addendum to Gas Monitoring Plan Revisions letter dated May 1, 2008, is acceptable and is hereby approved. Please begin using the Landfill Gas Monitoring Program for the City of Ann Arbor Landfill dated October 1997, and revised October 27, 1997, March 28, 2008, and May 1, 2008.

If you have any questions please contact me.

Sincerely,

Lawrence Bean

Lawrence Bean
District Geologist
Waste and Hazardous Materials Division
517-780-7842
BEANL@michigan.gov

cc: Mr. Daniel R. Meyers, Washtenaw County Department of Planning & Environment
Ms. Anne Warrow, City of Ann Arbor
Ms. Patti McCall, Geo Trans, Inc
Mr. Lee Carter, DEQ
Mr. Patrick Brennan, DEQ

ATTACHMENT B3

Gas Monitoring Report
First Quarter 2011

City of Ann Arbor Landfill
Ann Arbor, Michigan

April 20, 2011

TETRA TECH GEO

Gas Monitoring Report
First Quarter 2011

City of Ann Arbor Landfill
Ann Arbor, Michigan

Prepared for:

Matt Naud
Environmental Coordinator
City of Ann Arbor
Public Services Area
100 North Fifth Avenue
P.O. Box 8647
Ann Arbor, Michigan 48107-8647

Prepared by:

Tetra Tech GEO
710 Avis Drive
Ann Arbor, Michigan 48108

April 20, 2011

Alison Rauss

Alison D. Rauss
Staff Scientist

Patti J McCall

Patti J. McCall
Senior Project Geologist

\\Ierannfs2\projects-geo\Projects\Ann Arbor\Landfill\Gas Monitoring\Reports\2011\1st Quarter\1st Quarter Gas Report 2011.doc
117-1054006.02.02

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FIGURES

1. INTRODUCTION

Tetra Tech GEO completed the first quarter 2011 gas monitoring survey on January 11, 2011 at the Ann Arbor Landfill (AALF) located in Ann Arbor, Michigan. Gas monitoring was completed in accordance with the following:

- Addendum to Gas Plan Monitoring Revisions dated May 1, 2008; and,
- The Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended, and the rules promulgated under Part 115, specifically R 299.4433, which specifies Type II landfill explosive gas control and monitoring requirements.

During the spring of 2005, a methane collection system was installed along the north side of the Ann Arbor Landfill to prevent methane from migrating off the landfill property. The system has been operational since July 19, 2005. Additionally, methane from Phase I and II of the landfill is actively being recovered and converted to energy using a landfill gas recovery system located south of Phase II. This sampling represents a quarterly gas monitoring event.

2. FIELD MONITORING PROCEDURES

During this event, gas monitoring was performed at 35 locations associated with the AALF as depicted on **Figures 1** and **2**. **Table 1** presents the type of sampling location, number of sampling points and the names of each sampling location, as identified in **Figures 1** and **2**.

Carbon dioxide (% CO_2), oxygen (% O_2), methane (% CH_4), and the percent of methane by the lower explosion limit (LEL) were measured using a RKI Eagle Landfill Gas Meter. The meter was calibrated prior to use with a standard of known concentrations of methane and carbon dioxide.

Gas pressure was measured with magnehelic pressure gauges prior to monitoring concentrations in the gas probes. The magnehelic pressure gauges range from 0 to 1 inch of water column. A positive magnehelic measurement in a gas probe indicates that soil gas pressure is greater than atmospheric pressure while a negative measurement indicates that soil gas pressure is less than atmospheric pressure. Gas pressure measurements are not applicable within buildings or utility structures as these monitoring locations are at atmospheric pressure. Barometric pressure readings are obtained from local weather monitoring stations after the gas monitoring survey is completed.

3. GAS MONITORING RESULTS

In accordance with the NREPA PA 451, Rule 229.4433(1) (b), methane gas shall not be more than 100-percent of the LEL (5-percent methane by volume) at or beyond the property boundary. In addition, the AALF Gas Monitoring Plan requires response actions to be taken when methane is detected in excess of 25-percent of the LEL (1.25-percent methane by volume) in on-site utility structures or buildings. It should be noted that a detection of 0.1-percent methane by volume is considered valid when a concurrent LEL value is recorded. Otherwise, such a reading is attributed to meter drift.

Measurements collected during this survey are reported on **Table 2**. A summary of methane monitoring for the last eight quarterly surveys is presented on **Table 3**.

Review of **Table 2** indicates that methane was detected at a concentration of 4.5 percent methane by volume at GP-2S (**Figure 2**). This concentration is lower than the current response limit. Since methane concentrations were not detected at any gas monitoring locations surrounding GP-2S or across Ellsworth Road, and the north side methane collection system is operational, no additional response beyond current recovery activities is warranted for GP-2S.

4. NORTH SIDE METHANE COLLECTION SYSTEM

As part of the north side methane collection system, ten Perimeter Extraction Wells (PEWs) were installed along the south side of Ellsworth Road to prevent methane gas from migrating beyond the AALF property boundary. These wells are monitored quarterly for methane by volume, methane by LEL, CO_2, and oxygen. During these visits, the flow rate in each of the wells is adjusted as necessary. The blower skid system is monitored monthly to ensure methane capture is complete and the system is operating optimally.

On January 25, 2011 an additional port for the insertion of an anemometer or flow meter was added to the blower skid system stack. During the February monthly blower skid maintenance Tetra Tech GEO staff noticed maintenance issues that needed to be addressed at the blower skid. The fence surrounding the blower skid had settled and was no longer latching securely and the blower skid belts were worn with some cracking. The fence was temporarily fixed by City of Ann Arbor staff, but will need to be revisited next quarter once the ground has thawed. On February 4, 2011 Tetra Tech GEO staff replaced the blower skid belts.

A sensaphone was installed on February 8, 2011 and was determined to be defective. The system has been sent back for replacement. On February 22, 2011 during routine maintenance, the system was inactive, likely a result of a winter storm the previous evening. Gas readings were taken across the street at the Southeast Park from GP-6SR-99, GP-13-99, W-84-92 and Sanitary Sewer S2 to determine if methane had migrated across Ellsworth Road. Methane was not detected at any of these locations and the system was reset and turned on without issues.

On February 4, 2011 City of Ann Arbor Staff observed a high level alarm on the condensate water collection sump. On February 5, 2011 TetraTech GEO staff were onsite to investigate. The main power to the sump pump was turned off and the pump impellers were inspected. The impellers were clear and the pump was operable; however, the water level was still not dropping when the system was turned on manually. On February 8, 2011 the end of the discharge pipe was located in a sanitary sewer across the street. When the pump was turned on manually, no discharge was observed across the street. TetraTech GEO contacted the City's contracted plumber to clean out the discharge line on March 15, 2011 to determine if the 2 inch discharge line going underneath the street had collapsed or been blocked with sediment. A jet router was used to clean the line. The jet router easily moved through the discharge pipe, which suggests that the blockage may have been caused by ice present during the colder temperatures. The sump pump was turned back on and operated without incident, discharging all excessive water in the sump.

5. PROPOSED MONITORING CHANGES

During the first quarter of 2011 layout changes were finalized at the Materials Recovery Facility (MRF) building. A 60 foot long addition had been added to the west side of the building and equipment inside the building had been reconfigured. On March 18, 2011 Tetra Tech GEO staff visited the MRF building to reevaluate the gas sampling points inside the building for any new potential methane migration pathways. The previous gas monitoring points inside all buildings onsite are illustrated on **Figure 2**. The two locations inside the active portion of the MRF, MP-11 and MP-12 will remain. Monitoring point MP-13 (the crack on the floor at the 4th pillar) will be altered. This point is no longer at the western edge of the building, and the pillar is no longer in place. Instead, there are noticeable indentations running along the former edge of the building where the outer pillars once were and the new area is being used to store bailed recycling material. During the gas monitoring survey, Tetra Tech GEO personnel will attempt to monitor these former pillar locations when accessible. When inaccessible, the floor along the bailed material will be monitored.

Two additional points inside the MRF will be added to the gas sampling plan. In the southeastern section of the building a cracked depression in the floor of the tool storage area will be monitored as MP-16. A seam running east to west in the northwest addition will be monitored as MP-17. The revised monitoring points for the MRF are illustrated on **Figure 3**. These locations will be monitored quarterly beginning in April 2011.

6. CONCLUSIONS

Methane was detected at GP-2S within the landfill boundary below current action levels this quarter. Methane concentrations were not detected at any gas monitoring locations surrounding GP-2S. Tetra Tech GEO will continue to monitor this location quarterly for methane.

The north side methane PEWs will continue to be monitored on a quarterly basis. To ensure optimal performance of the extraction system, blower skid maintenance will continue on a monthly basis.

TABLES

TABLE 1

Quarterly Gas Monitoring Locations

Ann Arbor Landfill
Ann Arbor, Michigan

Sampling Locations	Number of Sampling Points	Gas Sampling Location Names as Identified on Corresponding Figures
Sanitary Sewers	2	S1 and S3
Storm Sewer Manholes	2	R1 and R2
Indoor Locations*	15	MP-1 through MP-15
Gas Probes	14	GP-1S/1D through GP-5S/5D, GP-7S-98/GP-7D-98, GP-8SR-05, and GP-8D-98
Temporary Gas Probes	1	TGP-2
Piezometer	1	P-3U

*Indoor Locations include: Materials Recovery Facility (MRF), Former Maintenance Building, Ann Arbor Drop Off Center and the Waste Transfer Station

TABLE 2

Gas Monitoring Data
January 11, 2011

Ann Arbor Landfill
Ann Arbor, Michigan

	Time				CH_4 by		Magnehelic		Barometric
Monitoring Location	**Initial**	**Final**	**% CO_2**	**% CH_4**	**LEL**	**% O_2**	**+**	**-**	**Pressure in Hg**
MP-1	10:24	10:24	0	0	0	20.9	NA	NA	30.12
MP-2	10:24	10:25	0	0	0	20.9	NA	NA	30.12
MP-3	10:23	10:24	0	0	0	20.9	NA	NA	30.12
MP-4	10:22	10:23	0	0	0	20.9	NA	NA	30.12
MP-5	10:25	10:26	0	0	0	20.9	NA	NA	30.12
MP-6	13:31	13:32	0	0	0	20.9	NA	NA	29.96
MP-7	13:27	13:28	0	0	0	20.7	NA	NA	29.96
MP-8	13:28	13:29	0	0	0	20.8	NA	NA	29.96
MP-9	13:26	13:27	0	0	0	20.7	NA	NA	29.96
MP-10	13:24	13:25	0	0	0	20.7	NA	NA	29.96
MP-11	10:55	10:56	0.4	0	0	20.7	NA	NA	30.12
MP-12	11:00	11:00	0	0	0	20.9	NA	NA	30.10
MP-13	11:03	11:04	0	0	0	20.9	NA	NA	30.08
MP-14	10:42	10:43	0	0	0	20.9	NA	NA	30.11
MP-15	10:40	10:41	0	0	0	20.9	NA	NA	30.10
S1 (Sanitary Sewer)	9:26	9:27	0	0	0	20.9	NA	NA	30.16
S3	11:24	11:25	0	0	0	20.9	NA	NA	30.07
R1 (Storm Sewer)	9:13	9:14	0	0	0	20.9	NA	NA	30.15
R2	13:42	13:43	0	0	0	20.9	NA	NA	29.95
GP-1S	9:17	9:19	0.2	0	0	20.4	0	0	30.15
GP-1D	9:20	9:21	0.2	0	0	20.9	0	0	30.15
GP-2S	9:38	9:40	6.6	4.5	90	8.9	0	0	30.16
GP-2D	9:36	9:38	0	0	0	20.9	0	0	30.16
GP-3S	11:15	11:16	0	0	0	20.9	0.1	<0	30.08
GP-3D	11:17	11:18	0	0	0	20.9	nm	nm	30.08
GP-4S	10:09	10:10	0.2	0	0	20.9	0	<0	30.14
GP-4D	10:06	10:08	2.8	0	0	18.8	0.01	<0	30.14
GP-5S	8:41	8:43	0	0	0	20.9	<0	0.01	30.19
GP-5D	8:44	8:46	0	0	0	20.9	<0	0.05	30.19
GP-7S-98	9:50	9:51	5.8	0	0	14.5	0.05	<0	30.16
GP-7D-98	9:48	9:49	6.0	0	0	14.5	0.02	<0	30.16
GP-8SR-05	8:29	8:32	11.7	0	0	9.8	0.01	<0	30.19
GP-8D-98	8:25	8:26	11.6	0	0	10.3	0.02	<0	30.19
TGP-2	8:51	8:52	3.6	0	0	17.8	NA	NA	30.19
P-3U	9:05	9:07	0	0	0	20.9	0	0	30.15

Notes:
NA = Not Applicable
% CO_2 = Percent Carbon Dioxide
% CH_4 = Percent Methane by volume
% O_2 = Percent Oxygen
% LEL = Percent Lower Explosive Limit

TABLE 3

Gas Monitoring Data
April 2, 2009 through January 11, 2011

Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		April 02, 2009		July 09, 2009		October 05, 2009		January 06, 2010		April 06, 2010		July 09, 2010		October 04, 2010*		January 11, 2011	
		% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Quarter Sampling Event		YES		YES		YES		YES		YES		YES		YES		YES	
Atmospheric Pressure		29.72 to 29.90 in Hg		29.85 to 29.86 in Hg		30.06 to 30.08 in Hg		30.06 to 30.10 in Hg		29.66 to 29.76 in Hg		29.92 to 29.95 in Hg		30.00 to 30.36 in Hg		29.95 to 30.19 in Hg	
Maintenance Building	Mon. Pt. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Recycling Drop Off Building	Mon. Pt. 7	0	0	0	0	0	0	0	0	**3.5^**	**79^**	0	0	0	0	0	0
	Mon. Pt. 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guard House	Mon. Pt. 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRF Building	Mon. Pt. 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt. 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Transfer Station	Mon. Pt 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mon. Pt 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sanitary Sewer	S1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S3	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
Storm Sewer	R1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas Probe	GP-1S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-1D	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0
	GP-2S	0	0	**10**	**>100**	**27**	**>100**	0.5	5	0	0	**5.5**	**>100**	**20.7**	**>100**	4.5	90
	GP-2D	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0
	GP-3S	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	GP-3D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4S	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0
	GP-4D	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0
	GP-5S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-7S-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-7D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8SR-05	<1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TGP-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	P-3U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

Previous data is not shown on this database table, but is available upon request.

New gas sampling plan revisions were adopted by MDEQ on June 16, 2008. Two new monitoring points were added in the Waste Transfer Station and several monitoring locations changed sampling frequency.

NA = Not accessible

% = Percent

LEL = Lower Explosive Limit

in Hg = Inches of mercury

Shading indicates an action required per the City of Ann Arbor Landfill Gas Monitoring Plan and Addendum

^ A reading from two inches above the floor of the Recycling Drop-Off Center to the breathing space was 0% methane by volume.
The reading could not be reproduced on April 8, 2010 and is likely due to the low pressure system.

*The readings for MP-1 through 15 and S4 were taken on October 5, 2010.

FIGURES

P:\Projects\Ann Arbor\Landfill\GIS\Figures\Gas\Figure 1_Quarterly Gas Monitoring Location Map.mxd

SOURCE: WASHTENAW COUNTY, 2005

◆ Quarterly Gas Monitoring Location (January, July)

— Slurry Wall*

R1	Storm Sewer Location
S1	Sanitary Sewer Location
GP-1S	Gas Probe Location
TGP-2	Temporary Gas Probe Location
P-3U	Piezometer Location

N

0 250 500 1,000 Feet

*Slurry Wall Location Is Approximate.

TETRA TECH GEO

CHECKED: PJM

DATE: 3/21/2011

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

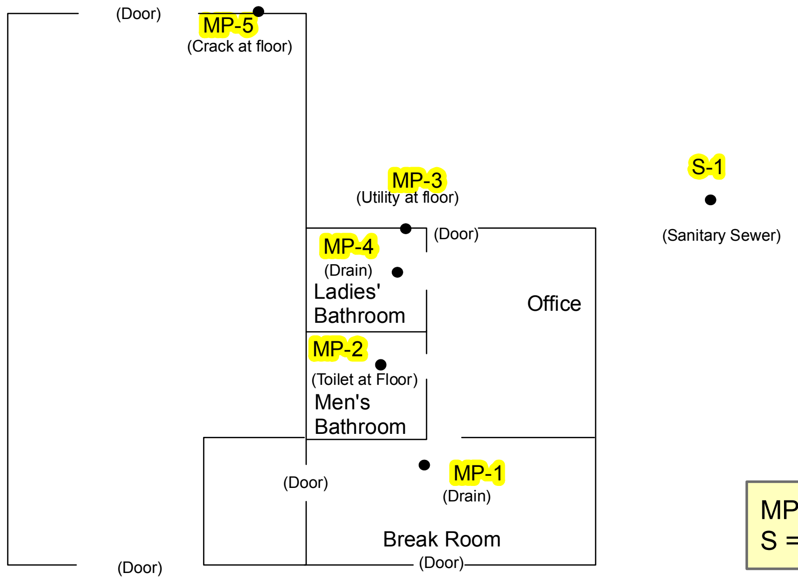
QUARTERLY GAS MONITORING LOCATION MAP

FIGURE

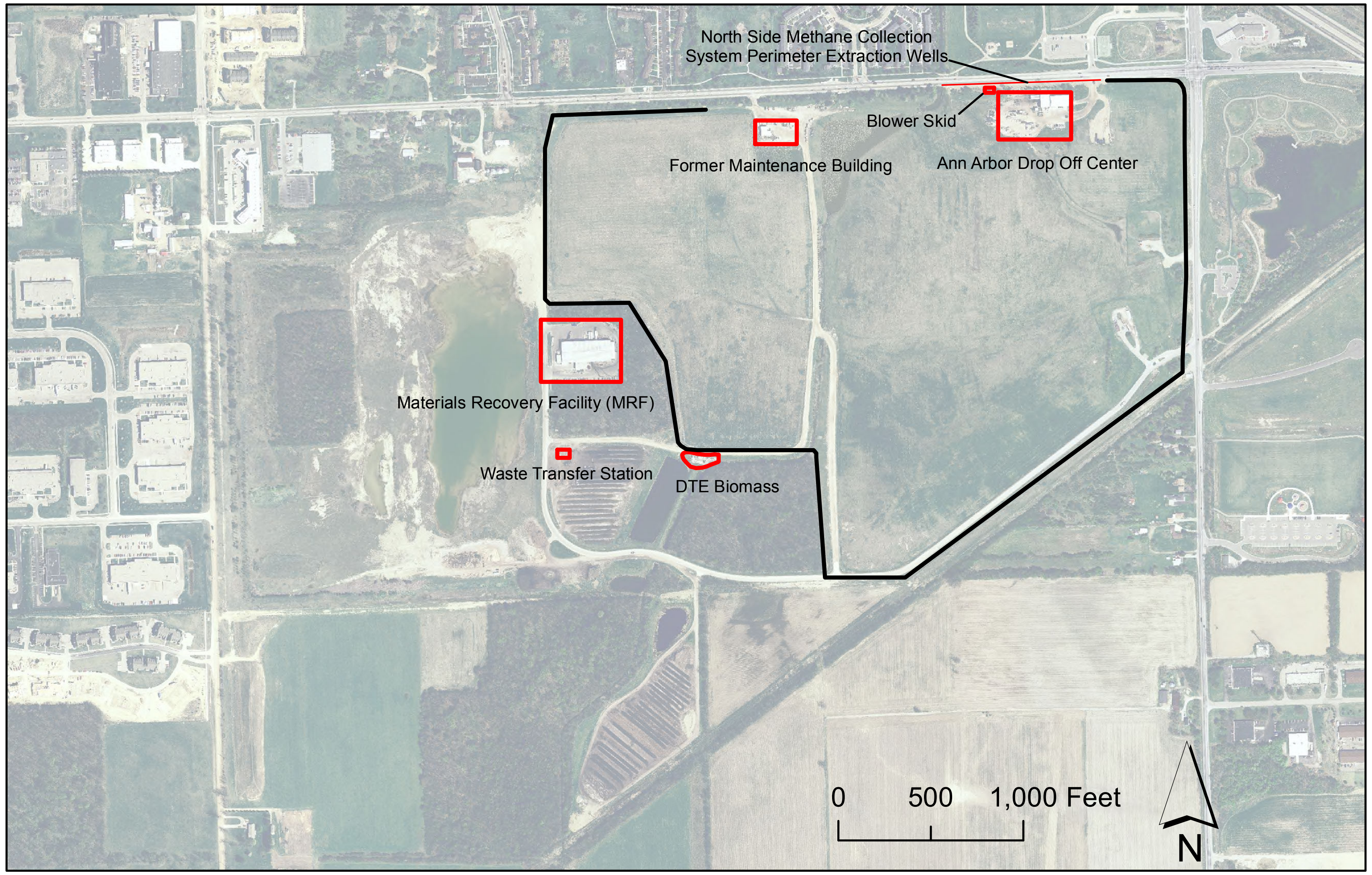
1

P:\Projects\Ann Arbor\Landfill\GIS\Figures\Gas\IndoorGasWells_rev3

Former Maintenance Building

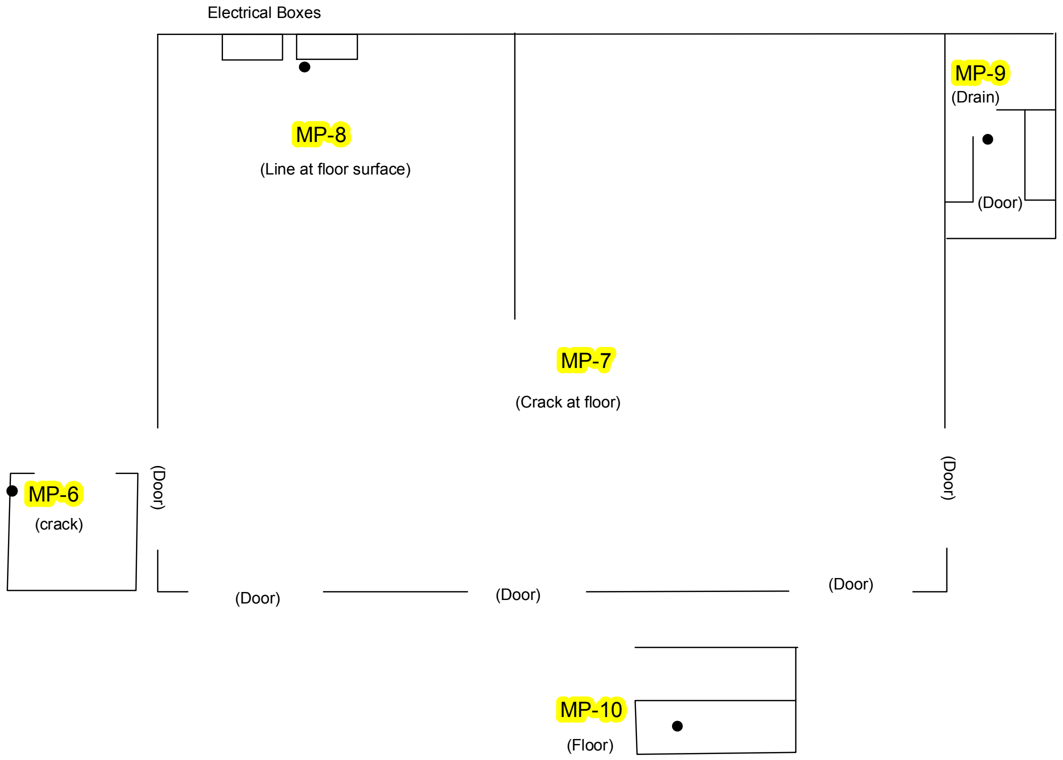


MP = Monitoring Point
S = Sanitary Sewer Location

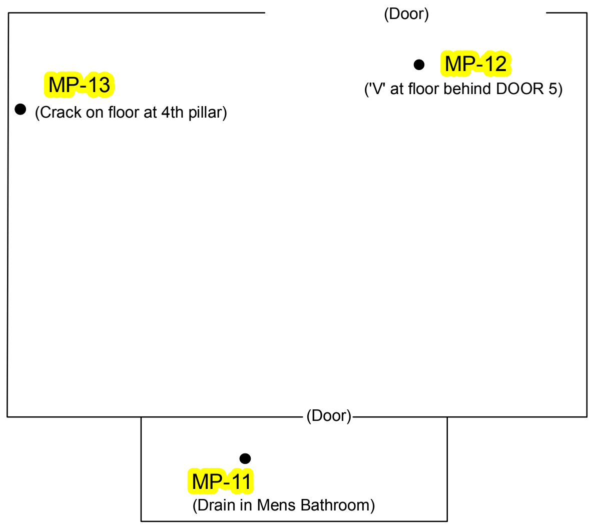


SOURCE: WASHTENAW COUNTY 2005 AERIAL PHOTOGRAPH

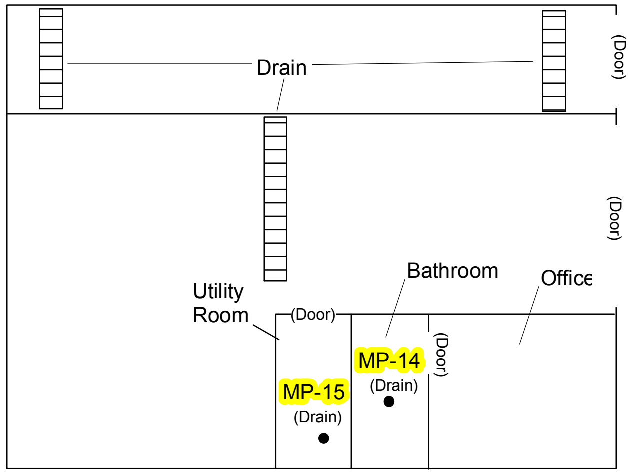
Ann Arbor Drop Off Center



MRF Building



Waste Transfer Station



TETRA TECH GEO

CHECKED: PJM

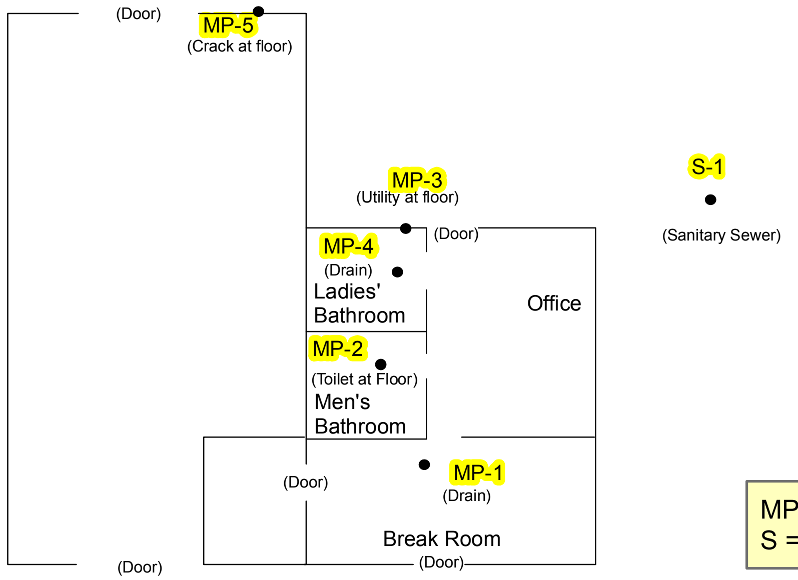
DATE: 8/2/2010

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

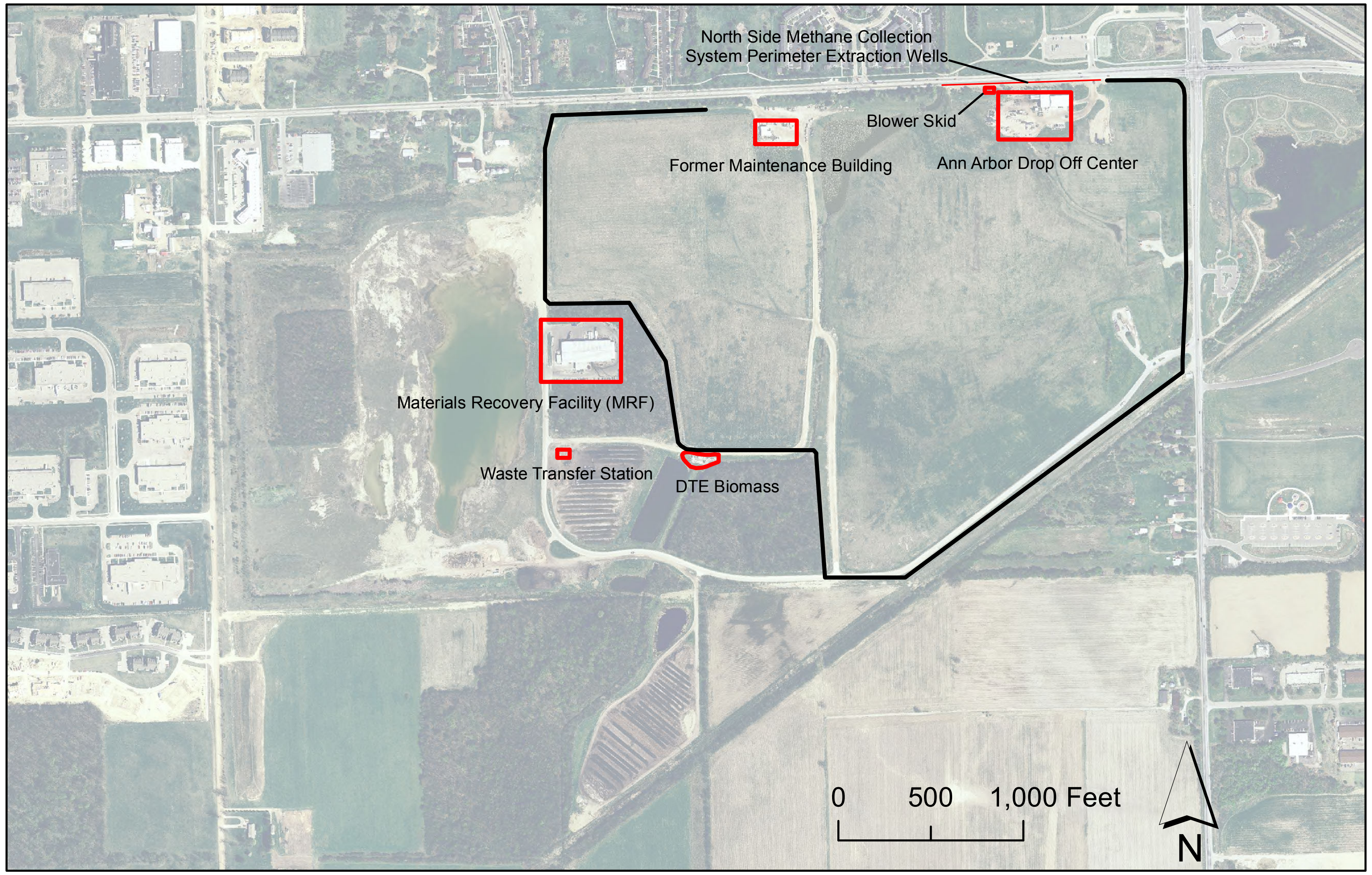
GAS MONITORING LOCATIONS INSIDE BUILDINGS

FIGURE
2

Former Maintenance Building

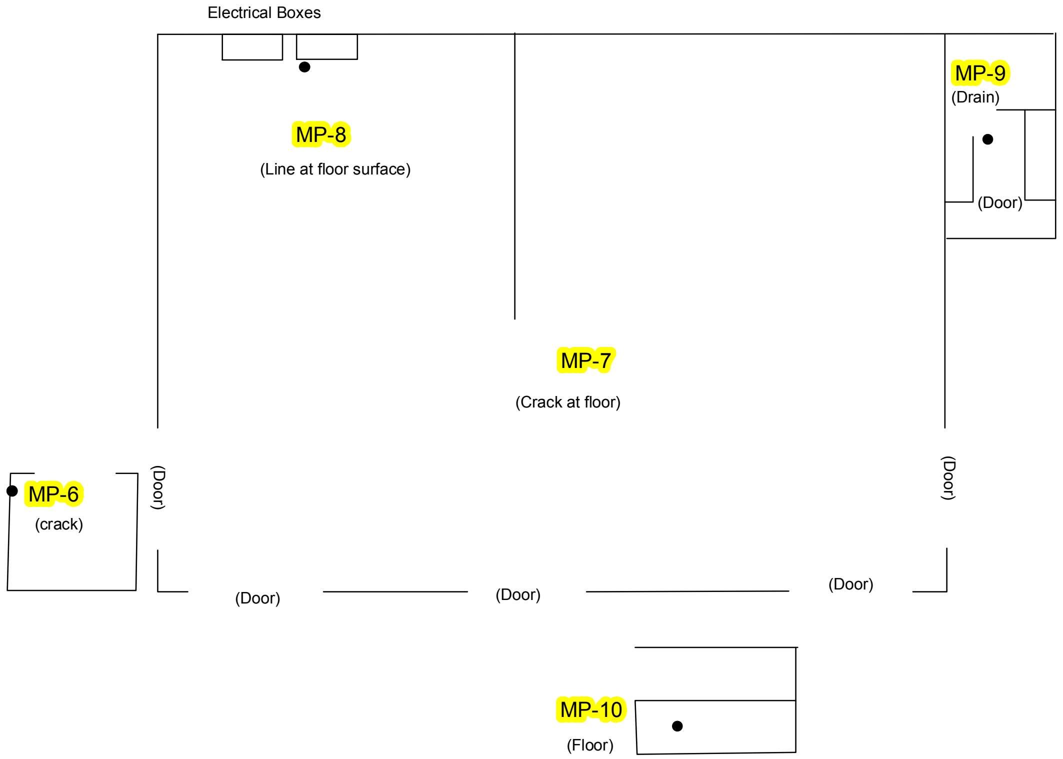


MP = Monitoring Point
S = Sanitary Sewer Location

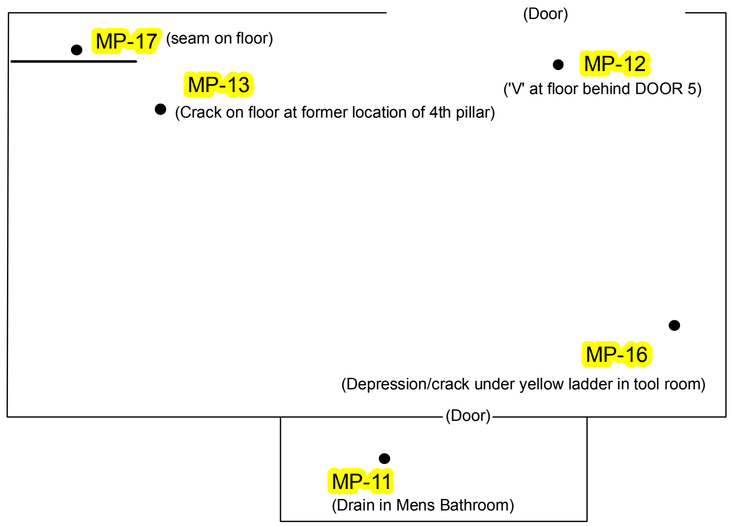


SOURCE: WASHTENAW COUNTY 2005 AERIAL PHOTOGRAPH

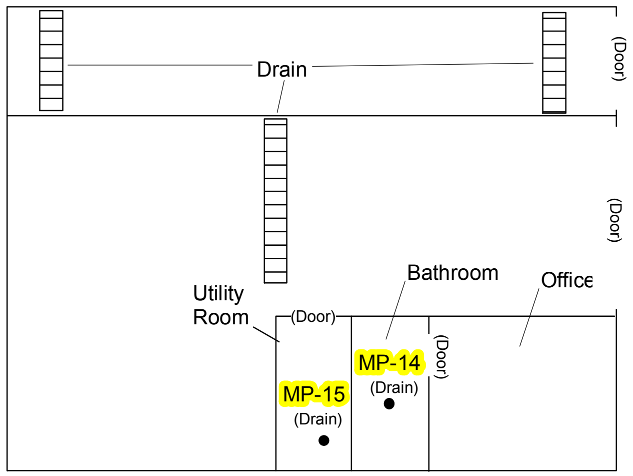
Ann Arbor Drop Off Center



MRF Building



Waste Transfer Station



TETRA TECH GEO

CHECKED: PJM
DATE: 3/21/2011

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

REVISED GAS MONITORING LOCATIONS INSIDE BUILDINGS

FIGURE
3

ATTACHMENT C

Attachment C
Proposed Gas Monitoring Locations
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		Current Monitoring Plan			Proposed Monitoring Plan	
		Quarterly Monitoring	Semi-Annual Monitoring	Annual Monitoring	Quarterly Monitoring	Semi-Annual Monitoring
Maintenance Building	MP-1	x	x	x	x	x
	MP-2	x	x	x	x	x
	MP-3	x	x	x	x	x
	MP-4	x	x	x	x	x
	MP-5	x	x	x	x	x
	MP-6	x	x	x	x	x
Ann Arbor Drop-off Station Building	MP-7	x	x	x	x	x
	MP-8	x	x	x	x	x
	MP-18	x	x	x	x	x
	MP-19	x	x	x	x	x
	MP-20	x	x	x	x	x
	MP-21	x	x	x	x	x
	MP-22	x	x	x	x	x
	MP-23	x	x	x	x	x
	MP-24	x	x	x	x	x
	MP-25	x	x	x	x	x
	MP-26	x	x	x	x	x
	MP-27	x	x	x	x	x
	MP-28	x	x	x	x	x
	MP-29	x	x	x	x	x
Guard House	MP-10	x	x	x	x	x
MRF Building	MP-11	x	x	x	x	x
	MP-12	x	x	x	x	x
	MP-13	x	x	x	x	x
	MP-16	x	x	x	x	x
	MP-17	x	x	x	x	x
Waste Transfer Station	MP-14	x	x	x	x	x
	MP-15	x	x	x	x	x
Water Main Manhole	**W**		x	**x**		
Sanitary Sewer	S1	x	x	x	x	x
	S2		x	x		x
	S3	x	x	x	x	x
	S4		**x**	**x**		
	S5		x	x		x
	S6		x	x		x
Storm Sewer	R1	x	x	x	x	x
	R2	x	x	x	x	x
	R3			**x**		
	R4			**x**		
	R5			**x**		
	R6		x	x		x
Water Meter Pit Manhole	MP		**x**	x		x
Gas Probe	GP-1S	x	x	x	x	x
	GP-1D	x	x	x	x	x
	GP-2S	x	x	x	x	x
	GP-2D	x	x	x	x	x
	GP-3S	x	x	x	x	x
	GP-3D	x	x	x	x	x
	GP-4S	x	x	x	x	x
	GP-4D	x	x	x	x	x
	GP-5S	x	x	x	x	x
	GP-5D	x	x	x	x	x
	GP-6SR-99		x	x		x
	GP-7S-98	x	x	x	x	x
	GP-7D-98	x	x	x	x	x
	GP-8SR-05	x	x	x	x	x
	GP-8D-98	x	x	x	x	x
	GP-10-99			**x**		
	GP-11-99			**x**		
	GP-12-99			**x**		
	GP-13-99		x	x		x
	GP-14-02		x	x		x
	GP-15-02		x	x		x
	GP-16-02		x	x		x
Temporary Gas Probes	TGP-1		**x**	x		x
	TGP-2	x	x	x	x	x
	P-3U	x	x	x	x	x
Concesssion Building and Area Utilities	**Women's Bathroom Drain**			**x**		
	Men's Bathroom Drain			**x**		
	Utility Room Drain			**x**		
	Utility Room Sump			**x**		
	Kitchen Drain - East			**x**		
	Kitchen Drain - West			**x**		
	Sanitary Sewer - Outside			**x**		
	Storm Sewer - Outside West			**x**		
	Storm Sewer - Outside East, South			**x**		
	Storm Sewer - Outside East, North			**x**		
	Storm Sewer - Outside North			**x**		
	Storm Sewer - Outside South			**x**		

Notes:
Locations in red font are proposed for removal from the gas monitoring plan beginning in June 2021.

ATTACHMENT D

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		January 7, 1997		March 6, 1997		March 11, 1997		March 17, 1997		March 25, 1997		April 1, 1997		April 14, 1997		July 30, 1997		August 6, 1997		October 6, 1997		October 7, 1997		October 10, 1997		October 14, 1997		October 16, 1997		October 30, 1997		December 2, 1997	
		Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL
Atmospheric Pressure		NM		NM		NM		NM		NM		NM		NM		29.4 inches Hg		NM		NM		NM		NM		NM		NM		NM		NM	
Maintenance	MP-1	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-2	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-4	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
Ann Arbor	MP-7	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-8	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-19	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-22	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-24	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-26	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-27	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-28	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-29	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Guard House	MP-10	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
MRF Building	MP-11	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-12	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-13	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	MP-16	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-17	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Waste Transfer Station	MP-14	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-15	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Water Main Manhole	W	NM	NM	0.05	1	0	0	0.7	14	>1	>20	>1	>20	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
Sanitary Sewer	S1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	S2	0	0	0.05	1	NM	NM	NM	NM	NM	NM	NM	NM	0.75	15	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	S3	0	0	0.05	1	0	0	0	0	1	20	>1	>20	0.8	16	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	S5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	S6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Storm Sewer	R1	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	R2	0	0	0.05	1	0	0	0	0	0	0	0.65	13	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	R3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	R4	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	R5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	R6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Water Meter Pit Manhole	MP	NM	NM	0.05	1	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM
Gas Probe	GP-1S	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0.2	4	NM	NM	NM	NM	NM	NM	0.5	10	0	0	0.5	10
	GP-1D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	0	NM	NM	NM	NM	NM	NM	0.3	6	0	0	0.3	6
	GP-2S	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	**6.6**	**132**	**6.5**	**130**	**6.3**	**126**	**7.7**	**154**	**8**	**150**	**8.6**	**172**	**8**	**150**
	GP-2D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0.1	2	0	0	0	0	0	0	0.5	8	0	0	0.5	8
	GP-3S	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	0	NM	NM	NM	NM	NM	NM	0.3	6	0	0	0.3	6
	GP-3D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	0	NM	NM	NM	NM	NM	NM	0.2	6	0	0	0.2	6
	GP-4S	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	0	NM	NM	NM	NM	NM	NM	0.2	4	0.1	2	0.2	4
	GP-4D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	0	NM	NM	NM	NM	NM	NM	0.2	4	0.05	1	0.2	4
	GP-5S	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	**9**	**182**	**8**	**162**	**8.1**	**164**	**8**	**160**	**7.2**	**148**	4.4	88	**7.2**	**148**
	GP-5D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	**8.9**	**178**	**8.1**	**164**	**8**	**160**	**7.9**	**158**	**7.1**	**146**	4.5	90	**7.1**	**146**
	GP-6SR-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-7S-98	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-7D-98	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-8SR-05	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-8D-98	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-10-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-11-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-12-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-13-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-14-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-15-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-16-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Temporary Gas Probes	TGP-1	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	TGP-2	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	P-3U	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		December 8, 1997		December 11, 1997		December 15, 1997		December 19, 1997		February 4, 1998		April 7,1998		July 24,1998		August 31,1998		September 24, 1998		September 30, 1998		29 & 30, 1999		April 14, 1999		July 14, 1999		July 15, 1999		July 28, 1999		August 3,1999	
		Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL
Atmospheric Pressure		NM		NM		NM		NM		NM		NM		NM		NM		NM		NM		NM		26.10 - 30.05 inHg		30.13 inHg		30.12 inHg.		29.89 - 29.93 inHg		29.96 inHg	
Maintenance	MP-1	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0		NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-2	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-3	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	*0.1	0	0	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-4	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-5	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-6	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
Ann Arbor	MP-7	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-8	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-19	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-22	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-24	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-26	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-27	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-28	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-29	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Guard House	MP-10	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
MRF Building	MP-11	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0-0.2*	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-12	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-13	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	MP-16	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-17	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Waste Transfer Station	MP-14	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-15	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Water Main Manhole	W	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	1	0	1	NM	NM	NM	NM	0	0	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM
Sanitary Sewer	S1	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	S2	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	1	0	1	NM	NM	0	0	0	0	0	0	0	0	0	0	NM	NM	0	*0.1	0	0
	S3	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	1	0.2	1	0.2	0	0	0	0	0		0	0	0	0	0	NM	NM	NM	NM	NM	NM
	S5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	1	0	1	NM	NM	NM	NM	0	0	0	0	0	0	0.6	17	0	0	0	*0.1	0	0
	S6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Storm Sewer	R1	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	R2	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	R3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0(f)	0(f)	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	R4	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0(f)	0(f)	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	R5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0(f)	0(f)	NM	NM	NM	NM	0	0	0	0	0	0	0	*1-0	NM	NM	NM	NM	NM	NM
	R6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0(f)	0(f)	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
Water Meter Pit Manhole	MP	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0.2	1	0.2	1	NM	NM	NM	NM	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0
Gas Probe	GP-1S	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0.6	1	0.2	0	0.2	>100	0.2	0	0	0-1*	0.2	0	0.2	0	0.4	0	NM	NM	NM	NM	NM	NM
	GP-1D	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0	0	0-1*	0.2	0	0	0	0.2	0	NM	NM	NM	NM	NM	NM
	GP-2S	NM	NM	12	>100	12	>100	NM	NM	3.4	44	3	50	36	>100	33	>100	39	>100	56	>100	6	>100	0.3	0	31	>100	24	>100	18	>100	24	>100
	GP-2D	NM	NM	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	NM	NM	0.3	>100	0	10
	GP-3S	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NA	NA	NM	NM	NM	NM	NM	NM
	GP-3D	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0.2	0	0	0	0.2	0	0.2	0	NM	NM	NM	NM	NM	NM
	GP-4S	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0.2	2	0	20.6	0.2	2	0	0	0	0	0.1	0	NM	NM	NM	NM	NM	NM
	GP-4D	NM	NM	0	0	NM	NM	NM	NM	0	0	0.3	1	0.4	11	0.3	1	0.8	7	0.3	1	0.2	0	0.2	0	1.1	8	NM	NM	NM	NM	NM	NM
	GP-5S	NM	NM	5	>100	5	>100	NM	NM	6	>100	4.3 (d)	-14 (d)	2.2	32	1.8	16	1.8	20	1.8	16	1.1	8	0.6	5	0	0	NM	NM	NM	NM	NM	NM
	GP-5D	NM	NM	5	>100	5	>100	NM	NM	4.9	88	2.4	35	0.6	2	0.7	12	0.4	10	0.7	12	0	0	0	3	0	0	NM	NM	NM	NM	NM	NM
	GP-6SR-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-7S-98	NI	NI	NI	NI	NI	NI	NI	NI	0	0	0	0	0	0	NM	NM	0.2	0	0.2	0	0	0	0.2	0	0	0	NM	NM	NM	NM	NM	NM
	GP-7D-98	NI	NI	NI	NI	NI	NI	NI	NI	0	0	0.2	1	0	*0 - 1.0	0	0-0.1*	0	0	0	2	0.2	0	0.2	0	0.2	0	NM	NM	NM	NM	NM	NM
	GP-8SR-05	NI	NI	NI	NI	NI	NI	NI	NI	10	>100	9	>100	8	>100	9	>100	9	>100	9	>100	7	>100	6	>100	5	>100	NM	NM	NM	NM	NM	NM
	GP-8D-98	NI	NI	NI	NI	NI	NI	NI	NI	5	>100	10	>100	8	>100	4.3	68	7	>100	7	>100	6	>100	4.8	>100	1.4	78	NM	NM	NM	NM	NM	NM
	GP-10-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-11-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-12-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-13-99	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-14-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-15-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-16-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Temporary Gas Probes	TGP-1	12 - 33 (b)	>100	0 (a)	0 (a)	0 (a)	0 (a)	7	>100	16	>100	15	>100	0	0	31	>100	12 - 33 (b)	>100	31	>100	9	>100	0.2	0	24	>100	21	1-2	22	>100	0	0
	TGP-2	0	0	0	0	0.5	10	NM	NM	0.2	0	0 (c)	1 (c)	0	0	NM	NM	NM	NM	0.2	1-2*	0	0	0	0	0	0	NM	NM	NM	NM	NM	NM
	P-3U	0.2	4	0	0	0.35	7	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0.2	0	0	0	0	0	NM	NM	NM	NM	NM	NM

Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		October 12, 1999		October 14, 1999		October 26, 1999		January 18 - 19, 2000		April 28, 2000		May 9,2000		July 18,2000		July 21,2000		July 24,2000		August 12,2000		August 15,2000		November 3,2000		January 16,2001		April 24,2001		May 1,2001		July 17,2001	
		Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL	Methane by Volume	Percent of LEL
Atmospheric Pressure		30.04-30.29 inHg		30.13-30.19 inHg		NM		29.85-30.08 inHg		29.91-29.96 inHg		NM		30.04-30.08 inHg		NM		NM		NM		30.05 in Hg		NM		30.06 to 30.11 in Hg		30.07 to 30.17 in Hg		29.96 to 29.98 in Hg		29.98 to 30.02 in Hg	
Maintenance	MP-1	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	MP-2	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	MP-3	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	MP-4	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	MP-5	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	MP-6	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
Ann Arbor	MP-7	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0-0.2	1	-0.2	0	NM	NM	0	0
	MP-8	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	1	0	0	NM	NM	0	0
	MP-18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-19	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-22	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-24	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-26	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-27	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-28	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-29	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Guard House	MP-10	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0-0.2	1	0	0	NM	NM	0	0
MRF Building	MP-11	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	MP-12	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	MP-13	**	**	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM
	MP-16	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-17	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Waste Transfer Station	MP-14	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-15	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Water Main Manhole	W	0	0	NM	NM	NM	NM	0	0	2.5	25	0	0	0.2	1	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
Sanitary Sewer	S1	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	3	0	0	0	0	NM	NM	0	0
	S2	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	S3	0.7	18	0.2	10	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	S5	0.3	7	0.3	13	NM	NM	0	0	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM
	S6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Storm Sewer	R1	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	R2	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0.3	1	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	R3	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	1	0	0	NM	NM	0.2	0
	R4	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	R5	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	R6	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	-0.2	0	NM	NM	0	0
Water Meter Pit Manhole	MP	0	0	0	0	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	-0.2	0	NM	NM	0	0
Gas Probe	GP-1S	0.2	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0.2	0	0	0	0	0	NM	NM	0	0
	GP-1D	0	0	NM	NM	NM	NM	0	4	0	0	NM	NM	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	GP-2S	**40**	**>100**	**13**	**>100**	NM	NM	3.7	>100	0	0	NM	NM	1.2	12	NM	NM	NM	NM	NM	NM	NM	NM	**13**	**>100**	2.1	76	0.6	23	NM	NM	**6**	**>100**
	GP-2D	0	0	0	10	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	**22/0.3***	**>100**
	GP-3S	0	0	NM	NM	NM	NM	0	4	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	GP-3D	0	0	NM	NM	NM	NM	0	0	0.2	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	GP-4S	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0.2	0
	GP-4D	1.1	0	0.2	0	NM	NM	0.2	0	0.2	0	NM	NM	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	0.2	0	0.2	3	0	3	NM	NM	0.4	3
	GP-5S	0.4	3	NM	NM	NM	NM	0.2	0	0	0	NM	NM	0.2	0	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0
	GP-5D	0.2	1	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0
	GP-6SR-99	NI	NI	NI	NI	NI	NI	3.3	92	**17**	**>100**	NM	NM	**56**	**>100**	**27**	**>100**	**44**	**>100**	**64**	**>100**	**63**	**>100**	0.2	0	**15**	**>100**	0.2	4	0.2	0	0	0
	GP-7S-98	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0.3	0
	GP-7D-98	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0.2	0
	GP-8SR-05	1.3	20	2.4	43	NM	NM	1.6	43	1.1	7	NM	NM	0.5	5	NM	NM	NM	NM	0.6	10	0.6	16	0.4	7	0	3	0	1	NM	NM	0.4	0
	GP-8D-98	3.2	49	3.3	52	NM	NM	1.9	46	1.1	7	NM	NM	0.8	4	NM	NM	NM	NM	0.8	19	0.8	20	0.6	10	0	2	0	0	NM	NM	0.2	0
	GP-10-99	NM	NM	NM	NM	NM	NM	0.2	0	0.2	0	NM	NM	0.3	0	NM	NM	NM	NM	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0	NM	NM	0.2	0
	GP-11-99	NM	NM	NM	NM	NM	NM	0.2	0	0	0	NM	NM	0	0	NM	NM	NM	NM	0.3	0	0	0	0	0	0	0	NM	NM	0.3	0	0	0
	GP-12-99	NM	NM	NM	NM	NM	NM	0.2	0	0.3	0	NM	NM	**45**	**>100**	**48**	**>100**	**33**	**>100**	**68**	**>100**	**65**	**>100**	**6**	**>100**	1.8	62	NM	NM	0.2	0	0.2	0
	GP-13-99	NM	NM	NM	NM	NM	NM	**19**	**>100**	**28**	**>100**	NM	NM	**34**	**>100**	NM	NM	NM	NM	**70**	**>100**	**49**	**>100**	**15**	**>100**	0	0	0.2	1	NM	NM	0.2	0
	GP-14-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-15-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
	GP-16-02	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Temporary Gas Probes	TGP-1	**14**	**>100**	**7**	**>100**	NM	NM	**9**	**>100**	**9**	**>100**	NM	NM	**9**	**>100**	NM	NM	NM	NM	**19**	**>100**	**15**	**>100**	0	0	0	0	NM	NM	0	0	0	0
	TGP-2	0.2	0-1*	0	0	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0.2	0	0.2	0	0	0	NM	NM	0	0
	P-3U	0	0-1*	NM	NM	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	NM	NM	0.2	0	0	0	0	0	NM	NM	0	0

Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021

Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		July 30,2001		October 24,2001		January 15 - 18, 2002		April 15, 2002		July 25, 2002		October 11, 2002		January 17,2003		February 7, 2003		February 21, 2003		April 25, 2003		July 17, 2003		July 23, 2003		July 28, 2003		August 04, 2003		August 06, 2003		August 11, 2003	
		Methane by Volume	Percent of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Atmospheric Pressure		NM		30.14		29.71 to 30.18 in Hg		29.83 in Hg		30.06 to 30.15 in Hg		30.12 to 30.18 in Hg		30.09 to 30.18 in Hg		29.98 to in Hg		29.83 to 29.89 in Hg		29.8 in Hg		29.8 in Hg		29.89 in Hg		29.98 to 30.01 in Hg		29.89 in Hg		29.86 to 29.89 in Hg		30.01 in Hg	
Maintenance	MP-1	NM	NM	0	0	0	1	0	0	0.2	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-2	NM	NM	0	0	0	0	0	0	0.2	0	0	0	0	0	NM	NM	NM	NM	0.2	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-3	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-4	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-5	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-6	NM	NM	0	1	0	0	0	0	0.2	2	0	0	-0.2	0-1*	NM	NM	NM	NM	0	0	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Ann Arbor	MP-7	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0-1*	NM	NM	NM	NM	0.2	1	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-8	NM	NM	0	0	0	1	0	0	0	0	0	0	0	0-1*	NM	NM	NM	NM	0.2	0	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-19	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-22	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-24	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-26	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-27	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-28	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-29	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Guard House	MP-10	NM	NM	0	0	0	0	0	0	0.2	0	0	0	0	0-1*	NM	NM	NM	NM	0.2	0	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MRF Building	MP-11	NM	NM	0	0	0	0	0	0	0	0	0	0	0	1	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-12	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	-0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-13	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-16	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-17	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Waste Transfer Station	MP-14	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-15	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Water Main Manhole	W	NM	NM	0.8	22	0	0	0	0	0	0	0	0	0	1	NM	NM	NM	NM	1	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Sanitary Sewer	S1	NM	NM	0	0	0	0	0	0	0	0	0.2	3	0	0	NM	NM	NM	NM	0.2	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	S2	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0-1*	NM	NM	NM	NM	0	0	0	3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	S3	NM	NM	0	0	0	0	0	0	0	1	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	S5	NM	NM	0	0	0	0	0	0	0	1	0	0	NA	NA	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	S6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Storm Sewer	R1	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	R2	NM	NM	0	0	0	0	0	0	0	0	0	1	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	R3	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	R4	NM	NM	0	0	0	0	0	1	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	R5	NM	NM	0	0	0	0	0	0	0	0	0	1	0	0-1*	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	R6	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Water Meter Pit Manhole	MP	NM	NM	0	0	0	0	0	0	0	0	0	0	0	1	NM	NM	NM	NM	0	0	-0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Gas Probe	GP-1S	NM	NM	0.2	0	0	0	0	0	0.2	0	0	2	0	0-1*	NM	NM	NM	NM	0.3	1	0.2	1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-1D	NM	NM	0.2	0	0	1	0	1	0.2	0	0.2	1	0	0	NM	NM	NM	NM	0.2	0	0.3	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-2S	NM	NM	**11**	**>100**	**8**	**>100**	0.3	13	**18**	**>100**	**17**	**>100**	**5**	**>100**	NM	NM	NM	NM	0	0	**14**	**>100**	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-2D	0.2	8	0.2	0	0	0	0	1	0	2	0	0	0.9	1+	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-3S	NM	NM	0	0	0	1	0	0	0.2	0	0	1	0	0-1*	NM	NM	NM	NM	0.2	3	0	1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-3D	NM	NM	0.2	0	0	1	0	0	0	0	0	1	0	2	NM	NM	NM	NM	0	0	0	1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-4S	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-4D	NM	NM	0	0	0	4	0	0	0.3	0	0	0	0.2	1	NM	NM	NM	NM	0.2	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-5S	NM	NM	0	0	0	0	0	0	0	0	0	0	0	1	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-5D	NM	NM	0	0	0	0	0	0	0	0	0.2	1	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-6SR-99	NM	NM	4	79	0	0	0	0	0.2	1	0.3	0	0.2	0	NM	NM	NM	NM	0.3	1	**60**	**>100**	**48**	**>100**	**28**	**>100**	**31**	**>100**	**21**	**>100**	**20**	**>100**
	GP-7S-98	NM	NM	0.2	0	0.2	1	0.2	0	0.2	0	0	0	1	0	NM	NM	NM	NM	0.2	1	0.3	1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-7D-98	NM	NM	0.2	0	0	1	0	0	0.2	0	0.2	1	0	1	NM	NM	NM	NM	0.2	1	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-8SR-05	NM	NM	0	-1	0	1	0.3	0	0.2	0	0.3	1	0	0-1*	NM	NM	NM	NM	0.2	0	0.4	-1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-8D-98	NM	NM	0	-1	0	2	0.2	1	0.3	0	0.2	-1	0	0	NM	NM	NM	NM	0.2	0	0.3	1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-10-99	NM	NM	0	0	0.2	1	0.2	0	0	0	0	0	0	1	NM	NM	NM	NM	0.2	1	0.2	>100	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-11-99	NM	NM	0	0	0	2	0	1	0	0	0.2	0	0.2	1	NM	NM	NM	NM	0.2	1	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	GP-12-99	NM	NM	0	0	NM	NM	0	0	0.2	1	0	0	0	0-1*	NM	NM	NM	NM	0	0	0	0	NM	NM	0.4	>100	0.2	>100/1	0.3	0	0.3	0
	GP-13-99	NM	NM	1.1	17	1.7	49	0	1	0.2	0	0.2	1	0	0	NM	NM	NM	0	0	0	**26**	**>100**	**58**	**>100**	**29**	**>100**	**40**	**>100**	**25**	**>100**	**19**	**>100**
	GP-14-02	NI		NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	1	0	0	0	0	0.2	0	0.2	1	NM	NM	0	1	0.2	1	0.2	-22	-0.3	0
	GP-15-02	NI		NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0	0	0	0	0	0	0.2	0	0	1	NM	NM	0.2	0	0.2	0	0.3	0	0.3	0
	GP-16-02	NI		NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0.3	10	0.2	6	0.3	6	0	0	0	0	NM	NM	0	1	0.2	0	0.2	-21	0.4	0
Temporary Gas Probes	TGP-1	NM	NM	0.2	2	1.2	50	2	63	0.5	15	0	0	NA	NA	NM	NM	NM	NM	0.6	7	0	0	NM	NM	0	0	0.7	24	0.3	-19	0.1	0
	TGP-2	NM	NM	0	0	0	0	0	1	0	0	0	1	0.2	1	NM	NM	NM	NM	0	1	0.2	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	P-3U	NM	NM	0.2	0	0	0	0	1	0.2	0	0	0	0	2	NM	NM	NM	NM	0	1	0	0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		August 18, 2003		August 25, 2003		September 02, 2003		September 08, 2003		September 17, 2003		September 08, 2003		September 17, 2003		September 22, 2003		September 22, 2003		October 06, 2003		October 14, 2003		October 20, 2003		October 30, 2003		November 03, 2003		January 28 & 29, 2004		April 05, 2004	
		% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Atmospheric Pressure		30.15 in Hg		30.01 in Hg		30.09 to 30.12 in Hg		30.09 to 30.12 in Hg		30.24 in Hg		30.12 in Hg		30.21 to 30.24 in Hg		28.59 in Hg		28.59 in Hg		30.01 in Hg		29.33 in Hg		30.00 in Hg		29.98-30.01 in Hg		30.12 in Hg		29.95 to 30.12 in Hg		30.17 to 30.21 in Hg	
Maintenance	MP-1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-2	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-4	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
Ann Arbor	MP-7	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-8	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-19	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-22	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-24	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-26	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-27	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-28	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-29	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Guard House	MP-10	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
MRF Building	MP-11	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-12	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-13	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	MP-16	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-17	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Waste Transfer Station	MP-14	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-15	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Water Main Manhole	W	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
Sanitary Sewer	S1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	2	0	1
	S2	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	S3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NA	NA	0	0
	S5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NA	NA	0	0
	S6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Storm Sewer	R1	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NA	NA	0	0
	R2	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NA	NA	0	0
	R3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	R4	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	R5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	R6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
Water Meter Pit Manhole	MP	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
Gas Probe	GP-1S	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	GP-1D	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	0
	GP-2S	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	**11**	**>100**	NM	NM	NM	NM	0.5	35	0.2	3
	GP-2D	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	2	NM	NM	NM	NM	0	0	0	0
	GP-3S	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.2	1	NM	NM	NM	NM	0	0	0	2
	GP-3D	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0	1
	GP-4S	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	2	0.2	2
	GP-4D	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	3	0.2	2
	GP-5S	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.3	0	NM	NM	NM	NM	0	0	0	1
	GP-5D	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.2	0	NM	NM	NM	NM	0	0	0	0
	GP-6SR-99	**19**	**>100**	**31**	**>100**	**18**	**>100**	**13**	**>100**	**12**	**>100**	**13**	**>100**	**12**	**>100**	**11**	**>100**	**11**	**>100**	1.7	0	0.2	0	0.2	2	0.2	0	0.2	0	0.2	0	0	0
	GP-7S-98	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.2	0	NM	NM	NM	NM	0	0	0	1
	GP-7D-98	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.2	1	NM	NM	NM	NM	0	0	0	1
	GP-8SR-05	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.3	0	NM	NM	NM	NM	NA	NA	NA	NA
	GP-8D-98	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.2	1	NM	NM	NM	NM	NA	NA	0.3	3
	GP-10-99	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0.2	0	0	0	0	0	0.2	1	0.2	1
	GP-11-99	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0.2	0	NM	NM	NM	NM	0	0	0.2	1
	GP-12-99	0.2	0	0.3	0	0.3	0	0	1	0.2	0	0	1	0.2	0	0	0	0	0	0	2	0	0	0	0	0.2	0	0	0	0	0	0.2	1
	GP-13-99	**15**	**>100**	**33**	**>100**	**19**	**>100**	**15**	**>100**	**18**	**>100**	**15**	**>100**	**18**	**>100**	**30**	**>100**	**30**	**>100**	2.5	**>100**	**14**	**>100**	**5**	**>100**	**5.2**	**>100**	**7**	**>100**	0	0	0	0
	GP-14-02	0	0	0.3	0	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0	0	0	0	0	0.2	0	0.2	0	0	0	0	0	0.2	0	0	0	0	0
	GP-15-02	0	0	0.3	0	-0.3	0	0	1	0.2	0	0.3	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-16-02	0	0	0.3	0	0.3	0	0.2	0	0.2	0	0.2	0	0.2	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0.2	0	0	0	0.2	1
Temporary Gas Probes	TGP-1	0.5	1	0.2	0	0	0	0	1	0.2	1	0	1	0.2	1	**11**	**>100**	**11**	**>100**	0	0	0	0	0	0	0	0	0	**>100**	0	0	0	0
	TGP-2	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	2	0	1
	P-3U	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	0	0	0.2	1

Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		July 29, 2004		October 18, 2004		January 10, 2005		April 04, 2005		July 19, 2005		October 17, 2005		January 10, 2006		April 17, 2006		July 18, 2006		October 23, 2006		January 03, 2007		April 03, 2007		July 17, 2007		October 02, 2007		January 08, 2008		April 02, 2008	
		% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Atmospheric Pressure		30.06 to 30.07 in Hg		29.94 to 30.08 in Hg		30.20 to 30.27 in Hg		30.20 to 30.27 in Hg		29.98 to 30.01 in Hg		29.79 to 30.01 in Hg		30.26 to 30.43 in Hg		29.86 to 29.89 in Hg		30.04 to 30.08 in Hg		29.93 to 29.96 in Hg		30.11 to 30.20 in Hg		29.87 to 30.05 in Hg		29.92 to 30.00 in Hg		30.04 to 30.12 in Hg		29.63 to 29.79 in Hg		30.43 to 30.53 in Hg	
Maintenance	MP-1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-2	0	0	0	0	-0.2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-3	0	0	0	0	-0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-4	0	0	0	0	0	0	0	1	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ann Arbor	MP-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	**11^**	**>100**	0	0
	MP-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-19	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-22	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-24	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-26	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-27	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-28	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-29	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Guard House	MP-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRF Building	MP-11	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-12	0	0	0	0	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0	0	0
	MP-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0	0	0
	MP-16	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-17	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Waste Transfer Station	MP-14	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-15	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Water Main Manhole	W	0	0	0	0	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	0	0
Sanitary Sewer	S1	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	S2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S3	0	0	0	0	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S5	0	0	0	0	NA	NA	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	S6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Storm Sewer	R1	0	0	0	0	0	0	0	2	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	0	0	0	0	0	0	0	0	-0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R6	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	0	0
Water Meter Pit Manhole	MP	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas Probe	GP-1S	0	0	0.2	1	0	0	0	2	0	0	0.2	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
	GP-1D	0	0	0	0	0	0	0	2	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-2S	**13**	**>100**	**6**	**>100**	3.4	>100	0.2	3	4.2	>100	**26**	**>100**	2.5	>100	0.2	1	**13**	**>100**	**12**	**>100**	0.6	16	0	1	**31.5**	**>100**	**25.1**	**>100**	**1.5**	**29**	0.1	1
	GP-2D	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0	0	0
	GP-3S	0	0	0	0	0	2	0.1	2	0	1	0	0	0	0	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0
	GP-3D	0	0	0	1	0	1	0.3	2	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1	0	0	0	0	0	0	0	0	0	0
	GP-4S	0.2	1	0	0	0.2	0	0	0	0	0	0.2	1	0	0	0.2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4D	0	0	0	0	0.2	1	0.2	5	0	0	0.2	2	0	0	0.3	3	0	2	0	1	0	3	0	2	0	0	0	0	0	0	0	0
	GP-5S	0	0	0.3	1	0	0	0	2	0	1	0.2	0	0	0	0.3	2	0.2	0	0	0	0	2	0	2	0	0	0	0	0	0	0.1	1
	GP-5D	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0.2	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0
	GP-6SR-99	0	0	0	0	0.3	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-7S-98	0	0	0	1	0	1	0.3	2	0	1	0	0	0	0	0	0	0	1	0	0	0	3	0	2	0	0	0	0	0	0	0	0
	GP-7D-98	0	0	0	1	0.2	1	0.3	2	0	1	2	0	0	0	0	0	0	1	0	0	0	3	0	1	0	0	0	0	0	0	0.1	1
	GP-8SR-05	NA	NA	NA	NA	NA	NA	0	2	0.2	1	0	0	0.3	0	0	0	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0.8/0.0^^	15/0.0^^
	GP-8D-98	0	0	0.3	0	0	0	0.2	2	0.2	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0.1	1
	GP-10-99	0.2	0	0.3	0	0.2	0	0	2	0.2	0	0.2	0	0.2	1	0.2	2	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0
	GP-11-99	0	1	0	0	0	1	0	1	0.3	1	0	1	0	0	0.2	1	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0
	GP-12-99	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	GP-13-99	**11**	**>100**	4.3	>100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
	GP-14-02	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0
	GP-15-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-16-02	0	0	0	1	0.2	1	0	0	0	0	0.2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Temporary Gas Probes	TGP-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0	0
	TGP-2	0	0	0.2	1	0	1	0	2	0	1	0	0	0	0	0.2	2	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0
	P-3U	0	0	0	1	0	1	0	2	0	1	0.2	1	0	0	0	0	0	0	0	0	0	1	0	2	NA	NA	NA	NA	0	0	0	0

Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		July 01- 02, 2008		October 02, 2008		January 06, 2009		April 02, 2009		July 09, 2009		October 05, 2009		January 06, 2010		April 06, 2010		July 09, 2010		October 04, 2010*		January 11, 2011		April 05, 2011		July 13, 2011**		October 04, 2011		January 04, 2012*^		April 10, 2012	
		% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Atmospheric Pressure		29.77 to 29.93 in Hg		29.85 to 29.89 in Hg		29.75 to 29.93 in Hg		29.72 to 29.90 in Hg		29.85 to 29.86 in Hg		30.06 to 30.08 in Hg		30.06 to 30.10 in Hg		29.66 to 29.76 in Hg		29.92 to 29.95 in Hg		30.00 to 30.36 in Hg		29.95 to 30.19 in Hg		29.67 to 29.74 in Hg		29.88 to 30.02 in Hg		30.25 to 30.29 in Hg		29.88 to 30.30 in Hg		29.89 to 29.92 in Hg	
Maintenance	MP-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ann Arbor	MP-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3.5^**	**79^**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-19	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-22	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-24	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-26	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-27	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-28	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	MP-29	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Guard House	MP-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRF Building	MP-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-16	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0
	MP-17	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0
Waste Transfer Station	MP-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Main Manhole	W	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
Sanitary Sewer	S1	0	0	0	0	0.2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S2	NA	NA	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
	S3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0.1	2	0	0	0	0	0	0	0	0
	S5	NM	NM	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
	S6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Storm Sewer	R1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R3	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	R4	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	R5	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	R6	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
Water Meter Pit Manhole	MP	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
Gas Probe	GP-1S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-1D	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-2S	**11.5**	**>100**	**15.5**	**>100**	0	0	0	0	**10**	**>100**	**27**	**>100**	0.5	5	0	0	**5.5**	**>100**	**20.7**	**>100**	4.5	90	0	0	0	0	0.9	18	2.5	50	1.6	31
	GP-2D	0	0	0	0	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-3S	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-3D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4S	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4D	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5S	0	0	0	0	0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5D	0	0	0	0	0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-6SR-99	NM	NM	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
	GP-7S-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-7D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8SR-05	0	0	0	0	0	0	<1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8D-98	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-10-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-11-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0.1	1
	GP-12-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-13-99	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
	GP-14-02	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
	GP-15-02	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
	GP-16-02	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
Temporary Gas Probes	TGP-1	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0
	TGP-2	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	P-3U	NM	NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		July 10, 2012		October 02, 2012		January 08, 2013		April 02, 2013		July 09, 2013		October 01, 2013		January 09, 2014		February 13, 2014		April 01, 2014		July 08, 2014		October 14, 2014		January 06, 2015		April 07, 2015	
		% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Atmospheric Pressure		30.11 to 30.12 in Hg		29.86 to 29.88 in Hg		30.22 to 30.28 in Hg		30.15 to 30.20 in Hg		29.97 to 30.00 in Hg		30.01 to 30.04 in Hg		30.47 to 30.63 in Hg		29.75 to 29.82 in Hg		29.77 to 29.82 in Hg		29.60 to 29.65 in Hg		29.60 to 29.65 in Hg		30.10 to 30.32 in Hg		30.15 to 30.20 in Hg	
Maintenance Building	MP-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ann Arbor Drop-off Station Building	MP-7	0	0	0	0	0.2	7	0	0	1.9	38	0.3	4	0.1	2	**7.5**	**>100**	**14.9**	**>100**	0	0	0	0	0	0	0	0
	MP-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	**26.0**	**>100**	0.9	18	0	0
	MP-19	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	2.5	50	0	0	0	0
	MP-20	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	**6.1**	**>100**	0.8	16	0	0
	MP-21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0
	MP-22	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0
	MP-23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0
	MP-24	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0
	MP-25	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0
	MP-26	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0
	MP-27	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0
	MP-28	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	3.7	65	0	0
	MP-29	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0	0	0	0	0	0	0
Guard House	MP-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRF Building	MP-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	MP-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	MP-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	MP-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	MP-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
Waste Transfer	MP-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	MP-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
Water Main Manhole	W	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	1.4	28	0	0	NM	NM	0	0	NM	NM	0	0
Sanitary Sewer	S1	0	0	0	0	0.1	3	0	0	0	0	0	0	0	0	0.2	2	0	0	0	0	0	0	0	0	0	0
	S2	0	0	0	0	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	S3	NM	NM	0	0	0	0	0	0	1.1	23	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	S4	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	S5	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	0	0	NM	NM	0	0	0	0	0	0
	S6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	0	0
Storm Sewer	R1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	R2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	R3	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	0	0
	R4	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	0	0
	R5	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	0	0
	R6	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
Water Meter Pit Manhole	MP	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
Gas Probe	GP-1S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	4	0	0	0	0	0	0	0	0	0	0
	GP-1D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-2S	**18.6**	**>100**	0	0	0	0	0	0	2.0	40	**16.6**	**>100**	0	0	0	0	0	0	**7.2**	**>100**	0.3	7	0	0	0	0
	GP-2D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-3S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-3D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-6SR-99	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	0	0	NM	NM	0	0	NM	NM	1.9	35
	GP-7S-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-7D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8SR-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	GP-8D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	0	0	0	0
	GP-10-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-11-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-12-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-13-99	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	NM	NM	0	0	NM	NM	0	0	0	0	**12.7**	**>100**
	GP-14-02	0	0	0	0	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	GP-15-02	0	0	0	0	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	0	0	NM	NM	0	0
	GP-16-02	NM	NM	0	0	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
Temporary Gas Probes	TGP-1	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	TGP-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	P-3U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		July 07, 2015		October 13, 2015		January 05, 2016		April 05, 2016		July 05, 2016		October 04, 2016		January 10, 2017		April 04, 2017		July 18, 2017		October 05, 2017		January 04, 2018		April 03, 2018		July 03, 2018	
		% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Atmospheric Pressure		29.85 to 29.88		29.55 to 29.60		30.58 to 30.67 in Hg		30.43 to 30.52 in Hg		29.87 to 29.88 in Hg		30.14 to 30.21 in Hg		29.50 to 29.88 in Hg		29.46 to 29.64 in Hg		30.09 to 30.10 in Hg		30.16 to 30.21 in Hg		30.09 to 30.17 in Hg		29.62 to 29.84 in Hg		29.30 in Hg	
Maintenance Building	MP-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ann Arbor Drop-off Station Building	MP-7	**4.6**	**92**	0	0	0	0	0	0	0	0	0	0	**1.5**	**30**	0	0	0	0	0	0	0	0	0	0	0	0
	MP-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-18	0.4	8	0	0	0	0	0	0	0	0	0	0	**1.4**	**28**	0	0	0	0	0	0	0.1	2	**6.2**	**>100**	0	0
	MP-19	**2.7**	**50**	0	0	0	0	0	0	0	0	0	0	**14.1**	**>100**	0	0	0	0	0	0	0	0	0.1	4	0	0
	MP-20	**20**	**>100**	0	0	0	0	0	0	0	0	0	0	**6.3**	**>100**	0	0	0	0	0	0	0	0	0.1	3	0	0
	MP-21	0.6	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-25	**5.6**	**>100**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guard House	MP-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRF Building	MP-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-16	0	0	0	0	0	0	0	0	0	0	NM*	NM*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Transfer	MP-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Main Manhole	W	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
Sanitary Sewer	S1	0	0	0	0	0.1	3	0	0	0	0	0.4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S2	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
	S3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S4	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
	S5	0	0	0	0	NM	NM	0	0	NM	NM	0	0	0	0	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM
	S6	0	0	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	NM	NM
Storm Sewer	R1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R3	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
	R4	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
	R5	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
	R6	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
Water Meter Pit Manhole	MP	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
Gas Probe	GP-1S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-1D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-2S	0.2	4	**22.6**	**>100**	0	0	0	0	**8.5**	**>100**	0	0	0	0	0	0	**5.6**	**>100**	0	0	0	0	0	0	0	0
	GP-2D	0	0	0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-3S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-3D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-6SR-99	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0.1	2	NM	NM	0	0	NM	NM	0	0	NM	NM
	GP-7S-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-7D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8SR-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-10-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	GP-11-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	GP-12-99	NM	NM	NM	NM	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM
	GP-13-99	0	0	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0	NM	NM	NM	NM	0	0	0	0	NM	NM
	GP-14-02	NM	NM	0	0	NM	NM	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM
	GP-15-02	NM	NM	0	0	NM	NM	0	0	0	0	0	0	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM
	GP-16-02	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	0	0	0	0	NM	NM
Temporary Gas Probes	TGP-1	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM
	TGP-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	P-3U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NM**	NM**	0	0	0	0	0	0	0	0

Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Monitoring Location		October 02, 2018		January 03, 2019		April 04, 2019		July 02, 2019		October 08, 2019		January 07, 2020		June 02, 2020		July 02, 2020		October 06, 2020		January 12, 2021		April 6, 2021	
		% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL	% Methane by Volume	% of LEL
Atmospheric Pressure		29.1 in Hg		29.1 in Hg		30.46 to 30.52 in Hg		29.23 to 29.25 in Hg		30.27 to 30.29 in Hg		29.96 in Hg		28.98 to 29.02 in Hg		29.15 to 29.22 in Hg		28.97 to 29.04 in Hg		29.23 in Hg		29.04 to 29.09 in Hg	
Maintenance Building	MP-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ann Arbor Drop-off Station Building	MP-7	0	0	0	0	0	0	0	0	0	0	0	0	**2.6**	**50**	0	0	0	0	0	0	0	0
	MP-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guard House	MP-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRF Building	MP-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Transfer	MP-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MP-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Main Manhole	W	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
Sanitary Sewer	S1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S2	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	S3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	S4	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	S5	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	S6	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
Storm Sewer	R1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R3	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	R4	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	R5	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	R6	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
Water Meter Pit Manhole	MP	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
Gas Probe	GP-1S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-1D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-2S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2.5**	**55**	0	0	0	0
	GP-2D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-3S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-3D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-4D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-5D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-6SR-99	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	GP-7S-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-7D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8SR-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-8D-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GP-10-99	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-11-99	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-12-99	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-13-99	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	GP-14-02	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	NM	NM	NM	NM	0	0
	GP-15-02	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	GP-16-02	0	0	NM	NM	0	0	0	0	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
Temporary Gas Probes	TGP-1	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0	NM	NM	0	0
	TGP-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	P-3U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

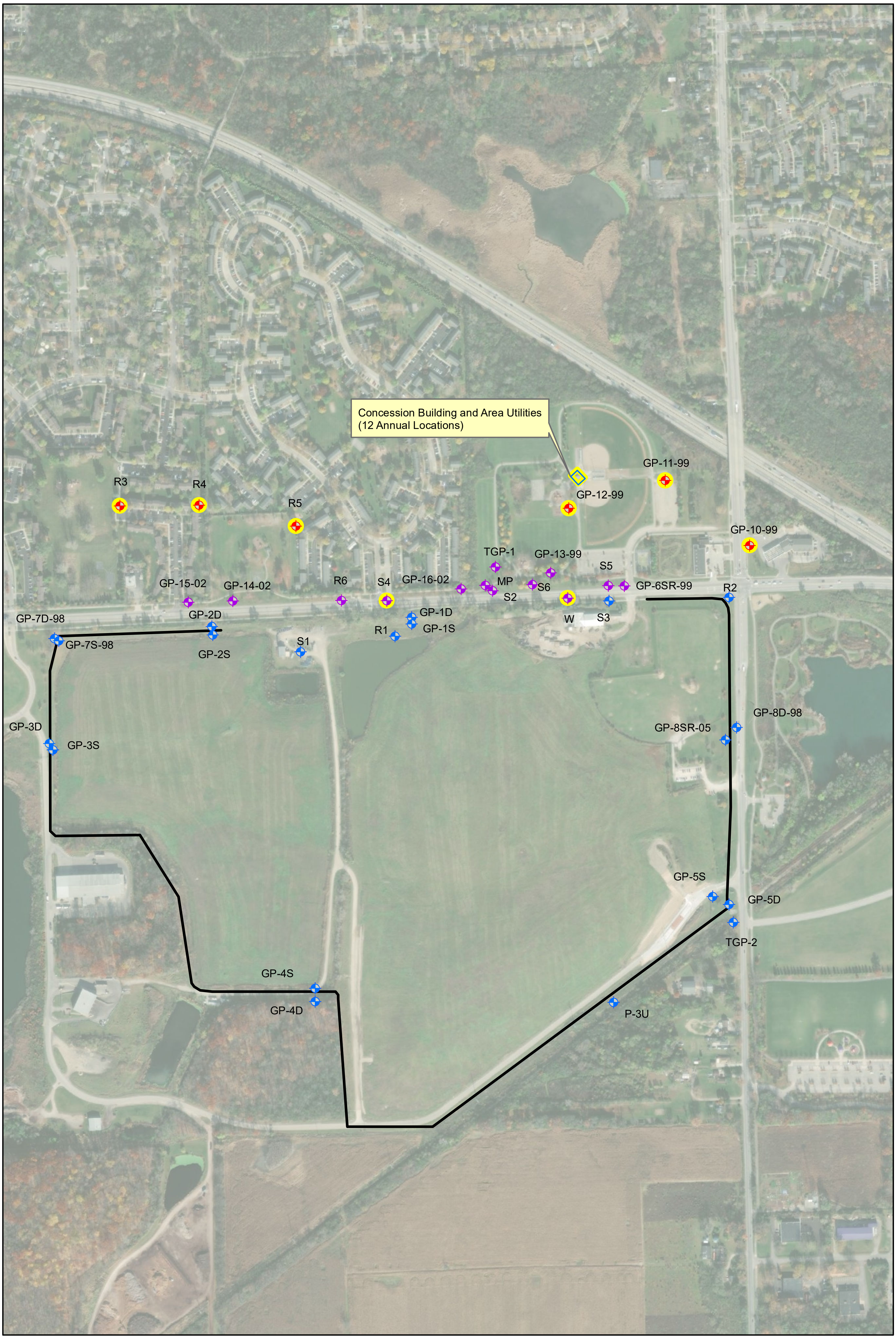
Notes listed on final page

Attachment D
Historical Data
January 7, 1997 through April 6, 2021
Ann Arbor Landfill
Ann Arbor, Michigan

Notes:
(a) After installation on 12/8/97, TGP-1 was left uncapped to vent. Readings on 12/10/97 and 12/15/97 were taken while the probe was uncapped. On 12/15/97, the gas probe was recapped. On 12/19/97, TGP-1 was sampled after being capped for 4-days.
(b) On December 8, 1997, readings in TGP-1 ranged between 12 to 33-percent methane by volume.
(c) Readings recorded on April 20, 1998.
(d) Readings recorded on April 21, 1998.
(e) Unable to locate monitoring point.
New gas sampling plan revisions were adopted by MDEQ on June 16, 2008.
Monitoring Points MP-18 through MP-29 were added to the Monitoring Plan on April 17, 2014.
NM = Not measured
NA = Not accessible
NI = Not installed
% = Percent
LEL = Lower Explosive Limit
in Hg = Inches of Mercury
Shading indicates an action required per the City of Ann Arbor Landfill Gas Monitoring Plan and Addendum.
* TGP-3 was damaged in July 2007. MDEQ approved abandonment of TGP-3 and quarterly sampling of P-3U in a letter dated January 11, 2008.
^ A reading from two inches above the floor of the Recycling Drop-Off Center to the breathing space was 0% methane by volume.
The reading could not be reproduced on April 8, 2010 and is likely due to the low pressure system.
^^ Number beneath forward slash indicates measured methane concentration May 8th, 2008.
*The readings for MP-1 through 15 and S4 were taken on October 5, 2010.
**The readings for MP- 6 through MP-10 were taken on July 12, 2011.
Monitoring Points MP-16 and MP-17 were added to the Landfill Gas Monitoring Plan prior to the April 2011 event.
*^The readings for MP-6 through MP-10 were measured on January 3, 2012.
*An additional gas monitoring event was completed on February 13, 2014 due to the extended period of time that the landfill gas recovery system was inoperable.
*MP-16 was inaccessible on October 4, 2016
**P-3U was damaged prior to July 2017 monitoring event. P-3U was repaired on July 20, 2017.
*** MP-9 was inaccessible on July 3, 2018. A drain in an adjacent utility closet was monitored instead in July 2018. Beginning in October 2018, this location was removed from the monitoring list.
GP-14-02 could not be located during the October 2020 event.

ATTACHMENT E

Document Path: P:\Projects\Ann Arbor\Landfill\GIS\Figures\Gas\Gas Plan Evaluation\Attachment E_Gas Monitoring Location Map.mxd



SOURCE: 2008 United States Geological Survey Aerial

- ⊕ Quarterly Gas Monitoring Location (January, July)
- ⊕ Semi-Annual Gas Monitoring Location (October)
- ⊕ Annual Gas Monitoring Location (April)
- ● Gas Monitoring Location Proposed for Removal
- — Slurry Wall*

R1	Storm Sewer Location
S1	Sanitary Sewer Location
GP-1S	Gas Probe Location
TGP-1	Temporary Gas Probe Location
W	Water Manhole
MP	Meter Pit
P-3U	Piezometer Location

N

0 250 500 1,000 Feet

*Slurry Wall Location Is Approximate.

TETRA TECH

CHECKED: PJM

DATE: 05/27/2021

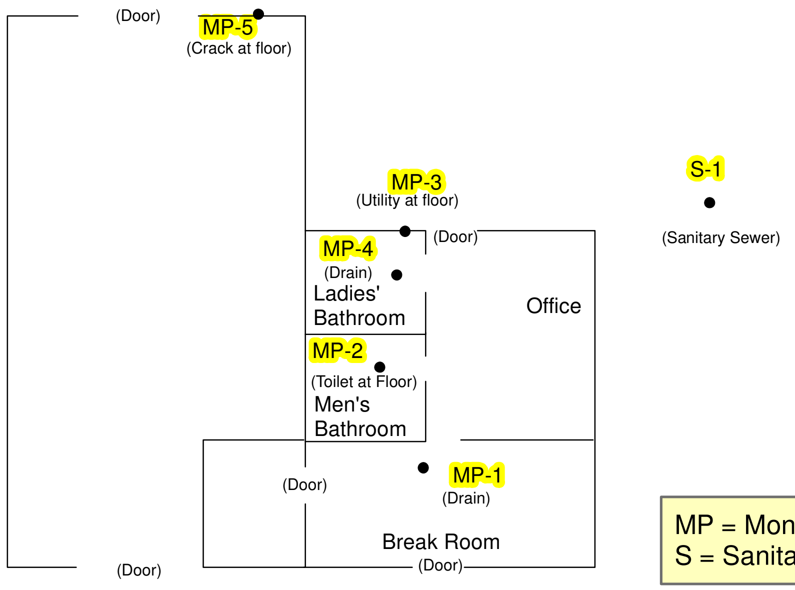
ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

PROPOSED GAS MONITORING LOCATIONS

ATTACHMENT
E

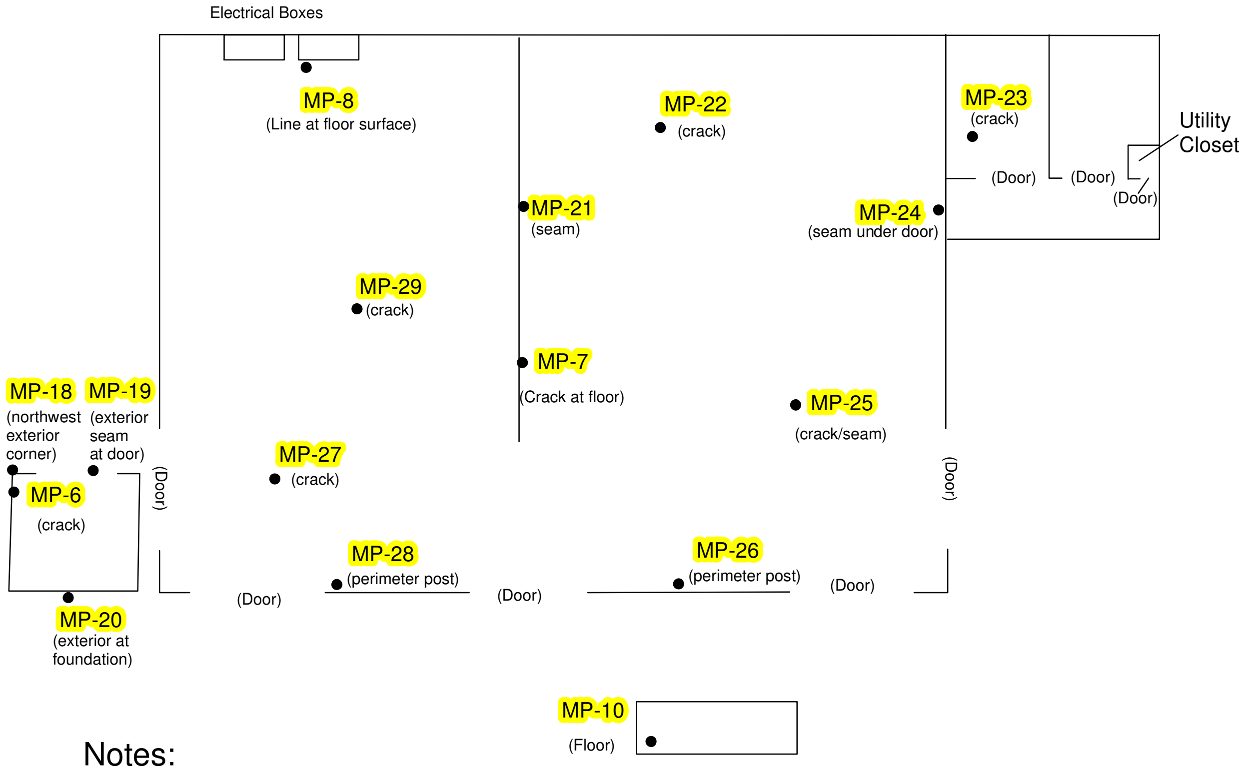
ATTACHMENT F

Former Maintenance Building

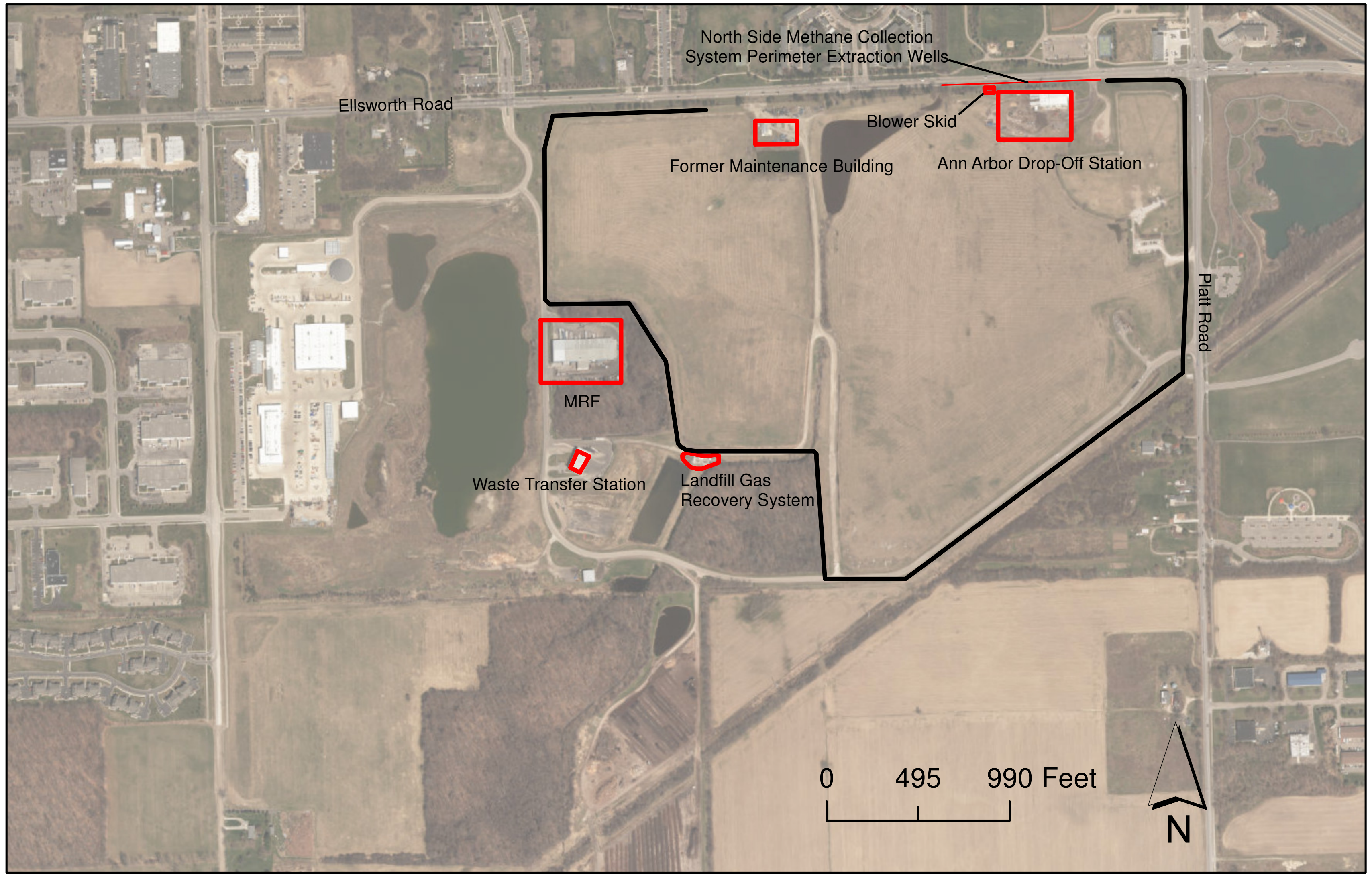


MP = Monitoring Point
S = Sanitary Sewer Location

Ann Arbor Drop-Off Station

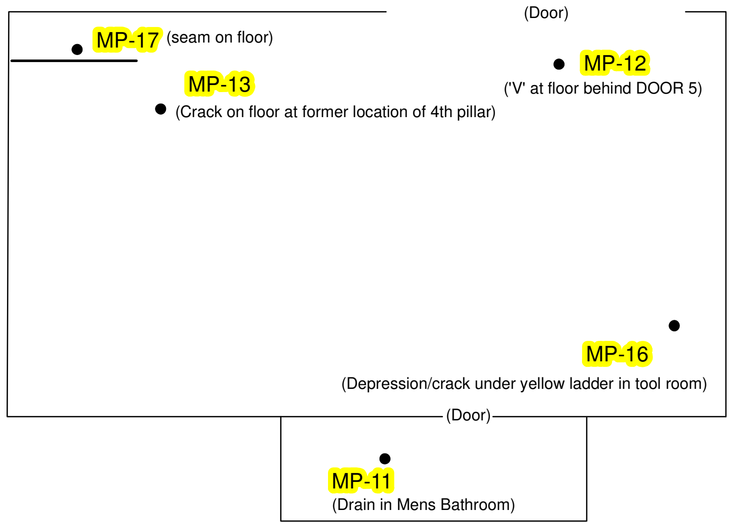


Notes:
MP-18 through MP-29 were added to the Monitoring Plan in April 2014.

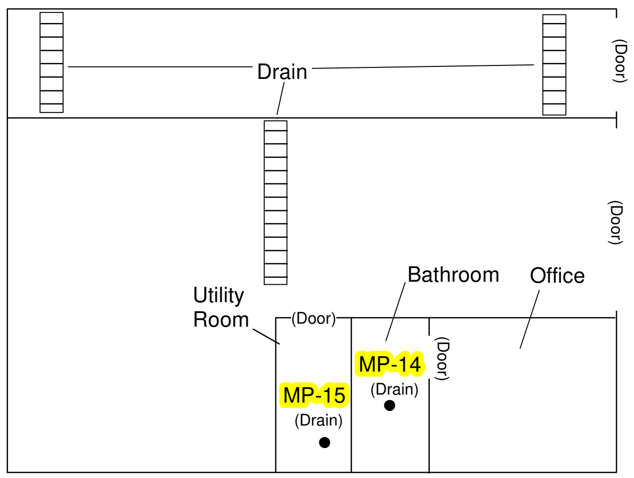


Base Map Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Materials Recovery Facility (MRF) Building



Waste Transfer Station



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TETRA TECH

CHECKED: PJM
DATE: 2/28/2019

ANN ARBOR LANDFILL
ANN ARBOR, MICHIGAN

AMBIENT GAS MONITORING LOCATIONS

ATTACHMENT
F

ATTACHMENT I

ANN ARBOR LANDFILL INDUSTUSTRIAL USER PERMIT 20240615

JUNE 15, 2024

INDUSTRIAL USER PERMIT No. 20240615

City of Ann Arbor Landfill

Site Address	Mailing Address
2800 Ellsworth Road	**P.O. Box 8647**
Ann Arbor, MI 48108	**Ann Arbor, MI 48107-8647**

is hereby authorized to discharge industrial wastewater from the above identified facility and through the outfalls identified herein into the City of Ann Arbor POTW in accordance with the conditions set forth in this Permit and Chapter 28 of the Ann Arbor City Code (Sewer Use Ordinance). Compliance with this Permit does not relieve the User of its obligation to comply with any or all applicable pre-treatment regulations, standards, or requirements under local, state, and federal laws, including any such regulations, standards, requirements, or laws that may become effective during the term of this Permit.

Noncompliance with any term or condition of this Permit shall constitute a violation of the Sewer Use Ordinance.

This Permit shall become effective on June 15, 2024 and shall expire at midnight on June 1, 2029.

If the User wishes to continue to discharge after the expiration date of this Permit, a complete application for reissuance of this Permit in accordance with the requirements of the Sewer Use Ordinance must be filed with Water Resource Recovery Facility Manager. This application is due a minimum of 180 days prior to the expiration date of this Permit.

By: Keith Sanders

Keith Sanders
Manager, Water Resource Recovery Facility

Issued this 10th day of June,2024.

PART 1. EFFLUENT LIMITATIONS

A. From the effective date until the expiration date of this Permit, the Permittee is authorized to discharge wastewater to the POTW from the outfall(s) listed below.

Outfall	Description	Monitoring Location
001	**Groundwater Purge Well PW-1R-12**	**42.229945 -83.707058**
003	**Leachate Collection MH-A**	**42.229557 -83.707835**
004	**Leachate Collection MH-B**	**42.229557 -83.707835**
005	**Groundwater Purge Well PW-2R-01**	**42.232754 -83.704622**
006	**Groundwater Purge Well PW-3R-12**	**42.230021 -83.703607**

B. From the effective date until the expiration date of this Permit, the discharge from the outfall(s) authorized in this Part shall comply with all requirements contained in the Sewer Use Ordinance, and any applicable state and federal pretreatment laws, regulations, standards, and requirements, including any such laws, regulations, standards, or requirements that may become effective during the term of this Permit.

From the effective date until the expiration date of this Permit, the discharge from the outfall(s) authorized in this Part shall not exceed the following limitations:

Effluent limitations specific to this permit are set forth in Appendix A attached hereto and made part hereof.

C. General Prohibited Discharges

1. The Permittee shall not discharge, cause to be discharged, or allow to be discharged into the POTW any of the following from any outfall:

   a. Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, pollutants with a closed cup flashpoint of less than 140^{o} Fahrenheit (60^{o} Centigrade), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ATSM standard D-93-79 or D-93-80k or a Setaflash Closed Cup Tester, using the test method specified in ATSM Standard D-3278-78 and pollutants which cause an exceedance of 10% of the lower explosive limit (LEL) at any point within the POTW.

b. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute or chronic health and safety problems for workers.

c. Pollutants which cause or may cause corrosive structural damage to the POTW but in no case wastewater with pH lower than 5.0 or higher than 10.0, or the pH values as specified in the Sewer Use Ordinance.

d. Solid or viscous pollutants in amounts which could cause or do cause either obstruction to flow or Interference in the POTW.

e. Any pollutant, including oxygen-demanding pollutants, released in a discharge at a flow rate and/or pollutant concentration which will cause or may cause Interference in the POTW.

f. Pollutants which may cause or do cause:

    (1) Impairment of the strength or durability of structures in the POTW.

    (2) Restriction of hydraulic capacity of structures in the POTW.

    (3) Unsafe conditions to personnel in the inspection or maintenance of structures of the POTW or unsafe conditions to the general public, with respect to the Collection System.

g. Heat in amounts which will inhibit biological activity in the POTW resulting in Interference, but in no case heat in such quantities that the temperature at the POTW Treatment Plant exceeds 40º Centigrade (104º Fahrenheit).

h. Pollutants which cause or may cause pass through or interference.

i. Any pollutants which exceed the limitations set forth in a federal categorical pretreatment standard.

j. Any noxious or malodorous liquids, gases, or solids which either singly or by interaction are capable of creating a public nuisance or a hazard to life.

k. Any pollutant introducing colors not removed in the treatment process, such as but not limited to, dye wastes and vegetable tanning solutions.

l. Any non-contact cooling water, storm water, groundwater (contaminated or uncontaminated), or surface water, unless separate POTW facilities are available and identified for the discharges or unless the Water Resource Recovery Facility Manager gives written permission to the Permittee for a temporary discharge of the waters based on hydraulic capacity and treatment impacts. Whether or not permission is given for a temporary discharge and its scope and duration shall be in the sole discretion of the Water Resource Recovery Facility Manager.

m. Any radioactive wastes in harmful quantities as such quantities are defined by applicable state and federal regulations.

n. Any solvent extractables (grease, fat, oil, or other freon soluble materials) in excess of a daily average of 50 mg/l.

o. Any grease, oil, or other pollutants that will become solid or viscous at a temperature of 60° C. or below after being discharged into the POTW.

p. An insoluble substance retained by a standard No. 8 sieve or having any dimension greater than 1/2 inch (1.27 centimeters).

q. Insoluble substances having a specific gravity greater than 2.65.

r. Improperly shredded garbage.

s. Sludge, screenings, or other residues which result from a treatment process unless the Water Resource Recovery Facility Manager has determined that it is amenable to treatment by the POTW without application of unusual means or expense.

t. Any petroleum oil or grease, non-biodegradable cutting oil, mineral oil, whether or not the oils or grease are used oils or grease.

u. A 7-day average flow which exceeds 2 percent of the average daily influent to the entire POTW for the previous calendar year.

v. Wastewater causing, alone or in combination with wastewater from other users, the POTW effluent to fail a toxicity test.

2. Unless specifically authorized herein or an Order of the City, the Permittee shall not discharge concentrations greater than the following:

Surchargeable Pollutant	Daily Maximum in 24-Hour Composite
BOD, mg/L	1,000
Total suspended solids, mg/L	1,000
Total phosphorus, mg/L	20
Ammonia nitrogen, mg/L	40

Non-surchargeable Pollutant	Daily Maximum in 24-Hour Composite[a]	Daily Maximum in Grab[b]	Instantaneous Maximum in Grab[b]
Total Arsenic, mg/L	1.6	--	--
Total Cadmium, mg/L	1.0	--	--
Total Chromium, mg/L	4.0	--	--
Total Copper, mg/L	4.0	--	--
Total Cyanide, mg/L	--	1.0	--
Total Lead, mg/L	0.5	--	--
Total Mercury, mg/L	NQ[c]	--	--
Total Molybdenum, mg/L	3.7		--
Total Nickel, mg/L	3.0	--	--
Total Selenium, mg/L	1.1	--	--
Total Silver mg/L	0.24	--	--
Total Zinc, mg/L	3.0	--	--
Fats, Oil & Grease, mg/L	--	--	100

[a] 24-hour composite sample shall be flow-proportional unless the Permittee has demonstrated that an alternative sampling technique (e.g., time-proportional composite) is representative of the discharge, and the City has approved a waiver.

[b] Grab samples shall be used for total cyanide and fats, oil & grease. For total cyanide, multiple grab samples collected during a 24-hour period may be composited in the field or in the laboratory prior to analysis.

[c] NQ indicates non-quantifiable, which means below the level of quantification (LOQ). . Unless specified otherwise in accordance with the Sewer Use Ordinance, the LOQ shall be 0.0002 mg/l which corresponds to testing with U.S. EPA Method 245.1. Discharge of mercury above the LOQ of 0.0002 mg/l is prohibited, except as specifically approved in accordance with the Sewer Use Ordinance. Where deemed necessary to meet requirements of the Mercury Pollutant Minimization Program, the City may specify a limit lower than the LOQ of 0.0002 mg/l and require low-level mercury testing with U.S. EPA Method 1631. Mercury sampling procedures, preservation and handling, and analytical protocol for compliance monitoring shall correspond to the required EPA test method.

3. Users exceeding any of the following pollutant concentrations may be subject to surcharges pursuant to the Sewer Use Ordinance.

Surchargeable Pollutant	Concentration in 24-Hour Composite
BOD, mg/l	230
Total suspended solids, mg/l	150
Total phosphorus, mg/l	4.9
Ammonia nitrogen, mg/l	25

PART 2. MONITORING REQUIREMENTS.

A. From the period beginning on the effective date of this Permit until the expiration date of this Permit, the Permittee shall sample and analyze the discharge from outfalls for those parameters and at those frequencies set forth in **Appendix A** attached hereto and made a part hereof.

B. Special Monitoring Provisions. The following special monitoring provisions apply to the Permittee's discharge(s):

1. *Annual Pollutant Scan*. Each year, the Permittee shall monitor and report concentrations of the following for both Outfall 001 and Outfall 006; and also for Outfall 005 when the flow volume of any quarter during the previous calendar year was 2,250,000 gallons or more (i.e., average of 25,000 gal/day):

- **Arsenic, Total**
- **Copper, Total**
- **Cyanides, Available**
- **Lead, Total**
- **Molybdenum, Total**
- **Nickel, Total**
- **Selenium, Total**
- **Zinc, Total**
- **Total Suspended Solids (TSS)**
- **Total Kjeldahl Nitrogen (TKN)**
- **Any of the remaining Priority Pollutants/Critical Materials and Other Pollutants of Concern (Appendix B) known or reasonably suspected to be quantifiable, except where waived in writing from the POTW.**

Samples shall be representative grabs, analyzed in accordance with the EPA-approved procedures contained in 40 CFR Part 136. The target quantification level shall be the lowest practical level of quantification, subject to concurrence of the POTW.

2. *Annual PFAS Screening* – Each year, the Permittee shall monitor and report concentrations of perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutane sulfonate (PFBS), perfluorohexanesulfonic acid (PFHxS) and perfluorononanoic acid (PFNA) for both Outfall 001 and Outfall 006; and also for Outfall 005 whenever the flow volume exceeded 2,250,000 gallons (i.e., average of 25,000 gal/day) during the previous quarter. All or part of this requirement may be waived in writing by the POTW.

Samples shall be representative grabs, analyzed in accordance with ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified). The target quantification level shall be 2.0 ng/L (0.002 µg/L), unless a higher quantification level is appropriate due to demonstrated sample matrix interference.

Sampling processes, decontamination procedures, and materials used in sampling shall be in accordance with guidelines from the Michigan Department of Environment, Great Lakes, and Energy, including the most recent version of *General PFAS Sampling Guidance* and *Wastewater PFAS Sampling Guidance*.

C. All measurements, tests, and analyses of the characteristics of the discharge shall be determined in accordance with the current EPA-approved procedures contained in 40 CFR Part 136, or another method accepted by the Water Resource Recovery Facility Manager where the above referenced procedures are not available or do not apply to the characteristic involved,

PART 3. REPORTING REQUIREMENTS.

A. Monitoring Reports. Monitoring results obtained shall be reported to the Water Resource Recovery Facility Manager as required in **Appendix A**. The report shall indicate the nature and concentration of all pollutants in the effluent for which sampling and analyses were performed, including flow measurements if required. The report shall include:

1. The date, exact place, time, and methods of sampling or measurements, and sample preservation techniques or procedures;
2. Who performed the sampling or measurements;
3. The date(s) analyses were performed;
4. Who performed the analyses;
5. The analytical techniques or methods used; and
6. The results of such analyses.

B. Additional Monitoring Data. If the Permittee monitors any pollutant more frequently than required by this Permit, using procedures described in Part II.C, the results of such monitoring shall be included in any calculations of compliance with effluent limitations and shall be reported in the periodic report submitted to the Water Resource Recovery Facility Manager. Such increased monitoring frequency shall also be indicated in the periodic report.

C. Report Certification. Monitoring reports filed by the Permittee to the Water Resource Recovery Facility Manager shall include a cover letter with a signed certification statement, laboratory reports, QA/QC data, and chain of custody for all parameters collected and analyzed. The certification statement shall read as follows:

> *I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

D. Reporting and Records.

1. Notice of New Pretreatment Equipment. The Permittee shall notify the Water Resource Recovery Facility Manager in writing within five (5) days after completing installation of new pretreatment facilities and the time it intends to commence operation thereof. The Permittee shall also notify the Water Resource Recovery Facility Manager when start-up of such facilities will occur, and the person who will conduct any tests to be performed.

2. Surveillance Reports. The Permittee shall file reports with the Water Resource Recovery Facility Manager as indicated below:

______ *Initial Report*: due ________________

______ *Monthly Reports:* due by the 15th day of the month for the preceding month.

__X__ *Quarterly Reports:* due by January 31st, April 30th, July 31st, and October 31st for the quarter ending on the last day of the preceding month.

______ *Semi-Annual Reports:* due by January 31st and July 31st for the preceding six (6) calendar months.

__X__ *Annual Reports:* due by July 31st each year for the preceding twelve (12) calendar months.

__X__ *Report on Changed Discharge*: due as soon as possible in advance of any substantial change in the volume or character of pollutants discharged, including hazardous wastes. The discharge of a pollutant or wastewater not described in the Permit application or in amounts in excess of the amounts described in the Permit application shall also be reported as soon as possible and in advance of the discharge

3. Notice of Exceedance.

a. The Permittee shall notify the Water Resource Recovery Facility Manager by telephone at (734) 794-6450 within twenty-four (24) hours of becoming aware of any permit exceedance.

b. A written follow-up shall be filed with the Water Resource Recovery Facility Manager within five (5) days of becoming aware of the violation. The report shall include, but not be limited to, the following:

    i. A description of the violation, the cause thereof, and the violation's impact on the Permittee's compliance status.
    ii. Duration of the violation, including exact dates and times of the violation, and the anticipated time the violation is expected to continue if not already corrected.
    iii. All steps taken, or intended to be taken, to reduce or eliminate reoccurrence of the violation.

  c. The Permittee shall repeat the sampling and pollutant analysis, and submit results to the Water Resource Recovery Facility Manager within thirty (30) days after becoming aware of the violation.

4. <u>Accidental Discharge.</u>

  a. The Permittee shall orally notify the Water Resource Recovery Facility Manager immediately upon discovery of an accidental discharge of substances prohibited by Sewer Use Ordinance or any slug loads or spills that may enter the public sewer system or the surface waters of the state. This notification shall include discharge location; date and time; type, concentration, and volume of waste; and corrective actions taken to mitigate the effect of the accidental discharge.

     Oral notifications by telephone shall use **(734) 794-6450** on weekdays from 8:00 AM to 4:30 PM except holidays, or **(734) 845-0781** for all other times. The "after hours" notification must not be left on voice mail. If no answer is received after two (2) call attempts, the Permittee may leave a voice mail message and call-back number.

  b. Within five (5) days following an accidental discharge, the Permittee shall submit a written report to the Water Resource Recovery Facility Manager. This report shall include the following at a minimum:
    i. Discharge location;
    ii. Date and time;
    iii. Type, concentration, and volume of waste;
    iv. Corrective actions taken to mitigate the accidental discharge;
    v. Cause of the accidental discharge and steps taken, or planned to be taken, to prevent a recurrence; and

vi. Effect on the Permittee’s compliance status.

c. Notification of an accidental release in accordance with this section does not relieve the Permittee of other reporting requirements that arise under local, state, or federal laws, or for liability for damages to the POTW or the environment.

5. Slug Discharge. A slug discharge or slug load means a discharge of a non-routine, episodic nature, including, but not limited to, an accidental spill or a non-customary batch discharge or any discharge which, in concentration of any given constituent or in quantity of flow, causes a temporary violation of pretreatment standards and requirements.

The Permittee’s requirements for a slug control plan shall be as indicated below:

__**X**__ The Permittee is not required to submit and implement a City-approvable slug control plan.

However, the Permittee shall immediately notify the Water Resource Recovery Facility Manager of any change that could affect its potential for a slug discharge or spill. At its discretion, the City may revise this permit to require implementation of a slug control plan.

______ The Permittee is shall submit to the Wastewater Services Manager or Assistant Manager a City-approvable slug control plan including, but not limited to, the following:

i. A description of discharge practices including non-routine batch discharges.

ii. A description of stored materials.

iii. Written procedures for accidental discharge notification in accordance with Section D.4 of this Part.

iv. Written procedures to mitigate the effects from accidental spills such as inspection and maintenance of storage areas; handling and transfer of materials, loading and unloading operations; control of plant site run-off; worker training; use of containment structures or equipment; measures for controlling release of toxic organic pollutants, including solvents; and measures and equipment for emergency response.

v. Schedule commitments for implementing the slug control plan.

The Permittee shall immediately notify the Water Resource Recovery Facility Manager of any change that could affect its potential for a slug discharge or spill. At its discretion, the City may require revision to an existing slug control plan.

6. Bypass. A bypass means the intentional diversion of waste streams from any portion of the Permittee's pretreatment facility.

a. If the Permittee knows in advance of the need for a bypass, it shall submit prior notice to the Water Resource Recovery Facility Manager a minimum of ten (10) days before the bypass date.

b. In the case of an unanticipated bypass that causes or could cause a violation of pretreatment standards and requirements, the Permittee shall:

i. Notify the Water Resource Recovery Facility Manager by telephone at (734) 794-6450 within twenty-four (24) hours of becoming aware of the bypass.

ii. Submit a written report to the Water Resource Recovery Facility Manager within five (5) days of becoming aware of the bypass. This report shall include the following at a minimum:

- Description of the bypass
- Cause of the bypass;
- Duration of the bypass, including exact dates and times
- If the bypass has not been corrected, the anticipated time it is expected to continue; and
- Steps taken, or planned to be taken, to prevent reoccurrence of the bypass.

The Water Resource Recovery Facility Manager may waive this written report requirement on a case-by-case basis if the oral report has been received within 24 hours.

c. Bypass is prohibited, and the City may take enforcement action against the Permittee for a bypass, unless:

i. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; and

    ii. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
    iii. The Permittee submitted notices as required under this section; and
    iv. The Permittee performed repeat sampling/analysis of any violating parameter, and submitted results to the Water Resource Recovery Facility Manager within 30 days after becoming aware of the violation.

7. <u>Upset</u>. An upset means an exceptional incident in which there is unintentional and temporary noncompliance because of factors beyond the reasonable control of the Permittee.

    a. An upset does not include noncompliance caused by operational error, improperly designed or inadequate pretreatment facilities, lack of preventive maintenance, or careless or improper operation.

    b. If the primary source of power of the pretreatment facility is reduced, lost, or fails, the Permittee shall control discharges, production, etc. to the extent necessary to maintain compliance with applicable pretreatment standards and requirements until the power is restored or an alternative method of treatment is provided.

    c. In order to establish the affirmative defense of an upset, the Permittee shall demonstrate through properly signed and contemporaneous operating logs or other relevant evidence that:
        i. An upset occurred and the Permittee can identify the cause(s) of the upset;
        ii. The Permittee's facility was, at the time, being operated in a prudent and workmanlike manner and in compliance with applicable operation and maintenance procedures;
        iii. The Permittee submitted the following information to the Water Resource Recovery Facility Manager within twenty-four (24) hours of becoming aware of the upset or, if notification was provided verbally, by

written submission within five (5) days of becoming aware of the upset:

- A description of the discharge and cause of noncompliance;
- The period of noncompliance, including exact dates and times;
- If not corrected, the anticipated time over which the noncompliance is expected to continue; and
- Steps being taken and/or planned to prevent recurrence of the noncompliance.

8. Categorical User Requirements (As Applicable)

a. Baseline Monitoring Report

i. Within one hundred eighty (180) days after the effective date of a federal categorical pretreatment standard applicable to the Permittee, or one hundred eighty (180) days after an administrative decision which determines the Permittee is subject to a federal categorical pretreatment standard, whichever is later, the Permittee shall submit a baseline monitoring report to the Water Resource Recovery Facility Manager in accordance with 40 CFR 403.12(b), as amended.

ii. At least ninety (90) days prior to commencement of discharge from the Permittee which is a new source subject to federal categorical pretreatment standards, the Permittee shall submit a baseline monitoring report to the Water Resource Recovery Facility Manager in accordance with 40 CFR 403.12(b), as amended.

b. Initial Compliance Report. Within ninety (90) days following the date for final compliance with federal categorical pretreatment standards applicable to the Permittee, or following commencement of a discharge from the Permittee which is a new source subject to federal categorical pretreatment standards, the Permittee shall submit an initial compliance report to the Water Resource Recovery Facility Manager in accordance with 40 CFR 403.12(d), as amended.

c. Continued Compliance Reports. After the compliance date for federal categorical pretreatment standards applicable to the Permittee, or following commencement of a discharge from the Permittee which is a new source subject to federal categorical pretreatment standards, the Permittee shall submit continued compliance reports to the Water Resource Recovery Facility Manager in accordance with 40 CFR 403.12(e), as amended.

9. Maintenance of Records.

   a. The Permittee shall maintain copies of all reports required by this Permit and the Sewer Use Ordinance, and records pertaining to those reports, for a minimum of three (3) years. This period shall be extended during the course of any unresolved litigation regarding the discharges of the Permittee or the City's Industrial Pretreatment Program; or when requested by the Water Resource Recovery Facility Manager, the State of Michigan, or the USEPA.

   b. The Permittee shall also maintain for a minimum of three (3) years records regarding the generation, treatment, storage, or disposal of hazardous waste or solid waste. These records shall be made available upon request to the Water Resource Recovery Facility Manager for inspection and copying, subject to the provisions regarding confidential Information in the Sewer Use Ordinance. Hazardous waste and solid waste shall have the same definition as provided in the Michigan Hazardous Waste Management Act, as amended, and rules promulgated thereunder.

PART 4. GENERAL CONDITIONS.

A. Special Agreement Provision. If this Permit contains effluent limits which are less restrictive than local limits set forth in the Sewer Use Ordinance, neither such less restrictive effluent limits nor this Permit shall be interpreted as creating any vested rights or property rights for the Permittee to continue discharging under such less restrictive effluent limits. The Water Resource Recovery Facility Manager may modify, or terminate, such less restrictive effluent limits at will at any time by providing notice to the Permittee.

B. Inspection and Entry. The Permittee shall allow the Water Resource Recovery Facility Manager, or a duly authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the Permittee's premises where a discharge originates, or where records must be kept under the conditions of this Permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit;

4. Sample or monitor, for the purposes of assuring Permit compliance, any substances or parameters at any location; and

5. Inspect any production, manufacturing, fabricating, or storage area where pollutants regulated under the Permit could originate, be stored, or be discharged to the POTW.

C. Extra-strength Surcharges. If the Permittee’s discharge exceeds any of the representative surchargeable compatible pollutant characteristics of normal domestic waste, as established in the Sewer Use Ordinance, the Water Resource Recovery Facility Manager may assign extra-strength surcharges to recover costs incurred to treat such discharges.

D. Dilution Prohibition. The Permittee shall not increase the use of potable or process water or, in any way, attempt to dilute an effluent as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this Permit.

E. Duty to Comply. The Permittee shall comply with all conditions of this Permit and the Sewer Use Ordinance. Failure to comply with any requirement of this Permit or the Sewer Use Ordinance may be grounds for administrative action, or enforcement proceedings including civil or criminal penalties and injunctive relief.

F. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or correct any adverse impact to the POTW or the environment resulting from noncompliance with this Permit, including accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

G. Permit Modifications. The Water Resource Recovery Facility Manager may amend this Permit in order to (1) assure compliance by the POTW with applicable laws, regulations, and the City's NPDES Permit, (2) account for substantial changes in discharges by the Permittee, (3) account for new information concerning the pollutants discharged by the Permittee, (4) reflect changes in federal or state laws and regulations or in City ordinances, (5) in the event there are operational changes at the POTW that, as determined by the Water Resource Recovery Facility Manager, require revision of the Permit, (6) modify or terminate any special agreement provision contained in a Permit, (7) correct typographical or other errors in the Permit, or (8) reflect a transfer of the Permit. The Permittee shall be informed of any changes in the Permit at least thirty (30) days prior to the effective date of change, unless a shorter time is necessary to meet applicable law or to protect human health or the environment.

H. Permit Revocation. The Water Resource Recovery Facility Manager may revoke this Permit during its term or deny renewal of this Permit if:

1. The Permittee has failed to comply with any condition of the Permit.

2. The Permittee fails, in the Permit application or during the Permit issuance process, to disclose fully all relevant facts, or the Permittee misrepresents any relevant fact at any time.

3. The Water Resource Recovery Facility Manager determines that the permitted discharge endangers human health or the environment and the threat can only be abated by revocation of the Permit.

4. A change in any condition that requires either a temporary or permanent reduction or elimination of the discharge.

5. The Permittee is in default, after having received written notice of such default, in the payment of fees or other amounts owed to the City related to wastewater matters.

6. Non-compliance by the Permittee with any provision of the Sewer Use Ordinance.

Upon revocation of its Permit, the Permittee shall immediately terminate its discharge to the POTW.

I. Duty to Provide Information. The Permittee shall furnish to the Water Resource Recovery Facility Manager within ten (10) days any information which may be requested to determine compliance with this Permit or to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit. The Permittee shall also, upon request, furnish within five (5) days to the Water Resource Recovery Facility Manager copies of any records required to be kept by this Permit.

J. Civil and Criminal Penalties and Other Liability. Any user who violates provisions of a permit or the Sewer Use Ordinance is subject to municipal civil infraction fines, administrative civil penalties of up to $1,000 per day per violation, judicial civil penalties of up to $1,000 per day per violation or more as allowed by the State of Michigan for home rule cities, and criminal penalties including a fine of up to $500 per day per violation and/or imprisonment for 90 days. Penalties may be cumulative, and may be augmented by administrative and judicial orders for recovery of costs, damages, and surcharges. Other penalties and sanctions may also apply under state or federal law.

K. Limitations of Permit Transfer. This Permit is not assignable to another permittee or transferable to any other location without prior written approval. The Water Resource Recovery Facility Manager may approve transfer of this Permit and make the necessary minor modifications to this Permit to show the transferee as the new Permittee, if the following conditions exist:

1. The transferor has not violated any provision of this Permit or Sewer Use Ordinance during the six (6) month period preceding the date of the transfer. The Permittee, in the event of a transfer, shall provide a copy of this Permit to the transferee prior to the date of transfer. The transferee shall provide a written statement to the Water Resource Recovery Facility Manager acknowledging receipt of a copy of the Permit and stating the transferee's agreement to be bound by the terms of the Permit.

2. As of the date of the transfer, there are no unpaid charges or fees due to the City from the Permittee related to use of the POTW.

3. The application for this Permit filed by the Permittee remains the same with respect to the discharge, facilities, and activities of the transferee, except as to the identity of the discharger.

4. The transferor provides written evidence to the Water Resource Recovery Facility Manager that a copy of this Permit has been provided to the transferee.

L. Falsifying Information. It is a criminal offense to knowingly make any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to this Permit, or to falsify, tamper with, or knowingly render inaccurate any monitoring device or method required under this Permit.

M. Severability. The provisions of this Permit are severable and, if any provision of this Permit or the application of any provision of this Permit to any circumstance is held invalid, the application of the provision to other circumstances and the remainder of this Permit shall not be affected thereby.

APPENDIX A
Effluent Limitations and Self-Monitoring Requirements

City of Ann Arbor Landfill

From the period beginning on the effective date of this Permit until the expiration date of this Permit, the Permittee shall comply with indicated discharge limits and sample, analyze, and report discharges at the indicated frequencies:

Outfall: **001 (PW-1R-12)**

Parameter (Units)	Discharge Limit	Monitoring Frequency	Reporting	Sampling Method
Flow Volume (gallons)	**Report**	**Quarterly**	**Also calculate and report average monthly flow in gallons/day**	**In-Line Meter**
Ammonia, as Nitrogen (mg/L)	**40**		**Quarterly**	**Composite**
Total Phosphorus (mg/L)	**20**			**Composite**
1,4-Dioxane (µg/L)	**Report**			**Grab**
Vinyl Chloride (µg/L)	**Report**			**Grab**
pH (s.u.)	**5.0 minimum** **10.0 maximum**			**Grab**

Notes:

1. **Permit conditions for this outfall are based on 24,100 gallons per day as the annual average discharge flow volume. This is not a flow limit.**

   The Permittee shall provide a Report on Changed Discharge notification to the Water Resource Recovery Facility Manager for any process modifications which may result in a substantial change from the permit basis flow volume; in this case, a substantial change shall mean either an increase or decrease of more than 20% in the annual average discharge flow volume.
2. **The Permittee is approved to use grab sample(s) in lieu of the required composite sampling, contingent upon continued applicability of the demonstration study dated May 8, 2014.**
3. **The Permittee shall comply with the special monitoring provisions of Part 2.B.1 and Part 2.B.2.**

APPENDIX A (continued)

Effluent Limitations and Self-Monitoring Requirements

City of Ann Arbor Landfill

From the period beginning on the effective date of this Permit until the expiration date of this Permit, the Permittee shall comply with indicated discharge limits and sample, analyze, and report discharges at the indicated frequencies:

Outfall: **003 (MH-A)**

Parameter (Units)	Discharge Limit	Monitoring Frequency	Reporting	Sampling Method
Flow Volume (gallons)	**Report**	**Quarterly**	**Also calculate and report average monthly flow in gallons/day**	**In-Line Meter**

Notes:

1. **Permit conditions for this outfall are based on <u><100 gallons per day</u> as the annual average discharge flow volume. This is not a flow limit.**

   The Permittee shall provide a Report on Changed Discharge notification to the Water Resource Recovery Facility Manager for any process modifications which may result in a substantial change from the permit basis flow volume; in this case, a substantial change shall mean an increase in the annual average discharge flow volume to more than 1,000 gallons per day.

APPENDIX A (continued)

Effluent Limitations and Self-Monitoring Requirements

City of Ann Arbor Landfill

From the period beginning on the effective date of this Permit until the expiration date of this Permit, the Permittee shall comply with indicated discharge limits and sample, analyze, and report discharges at the indicated frequencies:

Outfall: **004 (MH-B)**

Parameter (Units)	Discharge Limit	Monitoring Frequency	Reporting	Sampling Method
Flow Volume (gallons)	**Report**	**Quarterly**	**Also calculate and report average monthly flow in gallons/day**	**In-Line Meter**

Notes:

1. **Permit conditions for this outfall are based on <u><100 gallons per day</u> as the annual average discharge flow volume. This is not a flow limit.**

   The Permittee shall provide a Report on Changed Discharge notification to the Water Resource Recovery Facility Manager for any process modifications which may result in a substantial change from the from the permit basis flow volume; in this case, a substantial change shall mean an increase in the annual average discharge flow volume to more than 1,000 gallons per day.

APPENDIX A (continued)

Effluent Limitations and Self-Monitoring Requirements

City of Ann Arbor Landfill

From the period beginning on the effective date of this Permit until the expiration date of this Permit, the Permittee shall comply with indicated discharge limits and sample, analyze, and report discharges at the indicated frequencies:

Outfall: **005 (PW-2R-01)**

Parameter (Units)	Discharge Limit	Monitoring Frequency	Reporting	Sampling Method
Flow Volume (gallons)	**Report**	**Quarterly**	**Also calculate and report average monthly flow in gallons/day**	**In-Line Meter**
Ammonia, as Nitrogen (mg/L)	**40**	**Quarterly** Note 1	**Quarterly** Note 1	**Composite**
1,4-Dioxane (µg/L)	**Report**			**Grab**
Vinyl Chloride (µg/L)	**Report**			**Grab**
pH (s.u.)	**5.0 minimum 10.0 maximum**			**Grab**

Notes:

1. **The indicated monitoring and reporting frequencies shall apply whenever the flow volume during the previous quarter exceeded 2,250,000 gallons (i.e., average of 25,000 gal/day).**
2. **Permit conditions for this outfall are based on a maximum temporary discharge flow volume of 79,200 gallons per day during periods when Outfall #001 and/or Outfall #006 are out of service. This is not a flow limit.**

   The Permittee shall provide a Report on Changed Discharge notification to the Water Resource Recovery Facility Manager for any process modifications which may result in a substantial change from the permit basis flow volume; in this case, a substantial change shall mean an increase of more than 20% in the maximum temporary discharge flow volume.
3. **The Permittee is approved to use grab sample(s) in lieu of the required composite sampling, contingent upon continued applicability of the demonstration study dated May 8, 2014.**
4. **The Permittee shall comply with the special monitoring provisions of Part 2.B.1 and Part 2.B.2.**

APPENDIX A (continued)

Effluent Limitations and Self-Monitoring Requirements

City of Ann Arbor Landfill

From the period beginning on the effective date of this Permit until the expiration date of this Permit, the Permittee shall comply with indicated discharge limits and sample, analyze, and report discharges at the indicated frequencies:

Outfall: **006 (PW-3R-12)**

Parameter (Units)	Discharge Limit	Monitor	Report	Measurement
Flow Volume (gallons)	**Report**	**Quarterly**	**Also calculate and report average monthly flow in gallons/day**	**In-Line Meter**
Ammonia, as Nitrogen (mg/L)	**40**	**Quarterly**	**Quarterly**	**Composite**
1,4-Dioxane (μg/L)	**Report**			**Grab**
Vinyl Chloride (μg/L)	**Report**			**Grab**
pH (s.u.)	**5.0 minimum 10.0 maximum**			**Grab**

Notes:

1. **Permit conditions for this outfall are based on 28,000 gallons per day as annual average discharge flow volume. This is not a flow limit.**

   The Permittee shall provide a Report on Changed Discharge notification to the Water Resource Recovery Facility Manager for any process modifications which may result in a substantial change from the permit basis flow volume; in this case, a substantial change shall mean either an increase or decrease of more than 20% in the annual average discharge flow volume.

2. **The Permittee is approved to use grab sample(s) in lieu of the required composite sampling, contingent upon continued applicability of the demonstration study dated May 8, 2014.**

3. **The Permittee shall comply with the special monitoring provisions of Part 2.B.1 and Part 2.B.2.**

APPENDIX B

CITY OF ANN ARBOR
INDUSTRIAL PRETREATMENT PROGRAM

PRIORITY POLLUTANTS/CRITICAL MATERIALS

001 Acenaphthene
002 Acrolein
003 Acrylonitrile
004 Benzene
005 Benzidine
006 Carbon Tetrachloride [Tetrachloromethane]
007 Chlorobenzene
008 1,2,4-Trichlorobenzene
009 Hexachlorobenzene
010 1,2-Dichloroethane
011 1,1,1-Trichloreothane
012 Hexachloroethane
013 1,1-Dichloroethane
014 1,1,2-Trichloroethane
015 1,1,2,2-Tetrachloroethane
016 Chloroethane
018 bis (2-Chloroethyl) Ether
019 2-Chloroethyl Vinyl Ether
020 2-Chloronaphthalene
021 2,4, 6-Trichlorophenol
022 Parachlorometa Cresol
023 Chloroform [Trichloromethane]
024 2-Chlorophenol
025 1,2-Dichlorobenzene
026 1,3-Dichlorobenzene
027 1,4-Dichlorobenzene
028 3,3-Ddichlorobenzidine
029 1,1-Ddichloroethylene
030 1,2-trans-Dichloroethylene
031 2,4-Ddichlorophenol
032 1,2-Dichloropropane
033 1,2-Dichloropropylene [1,3-Dichloropropene]
034 2,4-Dimethylphenol
035 2,4-Dinitrotoluene
036 2,6-Ddinitrotoluene
037 1,2-Diphenylhydrazine
038 Ethylbenzene
039 Fluoranthene
040 4-Chlorophenyl Phenyl Ether
041 4-Bromophenyl Phenyl Ether
042 bis (2-Chloroisopropyl) Ether
043 bis (2-Chloroethoxy) Methane
044 Methylene Chloride [Dichloromethane]
045 Methyl Chloride [Chloro- methane]
046 Methyl Bromide [Bromomethane]
047 Bromoform [Tribromomethane]
048 Dichlorobromomethane
051 Chlorodibromomethane
052 Hexachlorobutadiene
053 Hexachloromyclopentadiene
054 Isophorone
055 Naphthalene
056 Nitrobenzene
057 2-Nitrophenol
058 4-Nitrophenol
059 2,4-Dinitrophenol
060 4,6-Dinitro-o-Cresol
061 N-Nitrosodimethylamine
062 N-Nitrosodiphenylamine
063 N-Nitrosodi-n-propylamin
064 Pentachlorophenol
065 Phenol
066 bis (2-Ethylhexyl) Phthalate
067 Butyl Benzyl Phthalate
068 Di-n-butyl Phthalate
069 Di-n-octyl Phthalate
070 Diethyl Phthalate
071 Dimethyl phthalate
072 1,2-Benzanthracene [Benzo(a)anthracene]
073 Benzo(a)pyrene [3,4-Benzo-pyrene]
074 3,4-Benzofluoranthene [Benzo(b)fluoranthene]
075 11,12-benzofluoranthene [Benzo(b)fluoranthene]
076 Chrysene
077 Acenaphthylene
078 Anthracene
079 1,1,2-Benzoperylene [Benzo(ghi)perylene]
080 Fluorene
081 Phenanthrene
082 1,2,5,6-Dibenzanthracene [Dibenzo(h)anthracene]
083 Indeno (1,2,3-cd) pyrene [2,3-o-pheynylene pyrene]
084 Pyrene
085 Tetrachloroethylene
086 Toluene
087 Trichloroethylene
088 Vinyl Chloride [Chloroethylene]
089 Aldrin
090 Dieldrin
091 Chlordane (technical mixture and metabolites)
092 4,4-DDT
093 4,4-DDE [p,p-DDX]
094 4,4-DDD [p,p-TDE]
095 alpha-Endosulfan
096 beta-Endosulfan
097 Endosulfan Sulfate
098 Endrin
099 Endrin Aldehyde
100 Heptachlor
101 Heptachlor Epoxide [BHC; hexachlorocyclohexane]
102 alpha-BHC
103 beta-BHC
104 gamma-BHC [Lindane]
105 delta-BHC [PCB; poly-chlorinated biphenyls]
106 PCB-1242 [Arochlor 1242]
107 PCB-1254 [Arochlor 1254]
108 PCB-1221 [Arochlor 1221]
109 PCB-1232 [Arochlor 1232]
110 PCB-1248 [Arochlor 1248]
111 PCB-1260 [Arochlor 1260]
112 PCB-1016 [Arochlor 1016]
113 Toxaphene
114 Antimony
115 Arsenic
116 Asbestos
117 Beryllium
118 Cadmium
119 Chromium
120 Copper
121 Cyanides
122 Lead
123 Mercury
124 Nickel
125 Selenium
126 Silver
127 Thallium
128 Zinc
129 2,3,7,8-Tetrachloro-dibenzo-p-dioxin [TCDD]

OTHER POLLUTANTS OF CONCERN

A 5-day Biochemical Oxygen Demand (BOD_5)
B Total Suspended Solids (TSS)
C Total Phosphorus
D Ammonia Nitrogen
E Total Fats, Oils & Grease (FOG)
F pH
G Molybdenum
H Chemical Oxygen Demand (COD)
I Total Dissolved Solids (TDS)
J Nonpolar FOG (petroleum-based)
K Temperature

APPENDIX A - SAMPLE CONTRACT

PROFESSIONAL SERVICES
AGREEMENT BETWEEN
[TBD]
AND THE CITY OF ANN ARBOR FOR
[TBD]

This agreement ("Agreement") is between the City of Ann Arbor, a Michigan municipal corporation, 301 E. Huron St. Ann Arbor, Michigan 48104 ("City"), and [TBD], a(n) [TBD] __________, [TBD], [TBD], [TBD] [TBD] ("Contractor"). City and Contractor agree as follows:

1. DEFINITIONS

Administering Service Area/Unit means [TBD]**.**

Contract Administrator means [TBD], acting personally or through any assistants authorized by the Administrator/Manager of the Administering Service Area/Unit.

Deliverables means all documents, plans, specifications, reports, recommendations, and other materials developed for and delivered to City by Contractor under this Agreement.

Effective Date means the date this Agreement is signed by the last party to sign it.

Project means [TBD].

Services means [TBD] as further described in Exhibit A.

2. DURATION

A. The obligations of this Agreement shall apply beginning on the Effective Date and this Agreement shall remain in effect until satisfactory completion of the Services unless terminated as provided for in this Agreement.

3. SERVICES

A. Contractor shall perform all Services in compliance with this Agreement. The City retains the right to make changes to the quantities of Services within the general scope of the Agreement at any time by a written order. If the changes add to or deduct from the extent of the Services, the compensation shall be adjusted accordingly. All such changes shall be executed under the conditions of the original Agreement.

B. Quality of Services under this Agreement shall be of the level of quality performed by persons regularly rendering this type of service. Determination of acceptable quality shall be made solely by the Contract Administrator.

C. Contractor shall perform Services in compliance with all applicable statutory, regulatory, and contractual requirements now or hereafter in effect. Contractor shall also comply with and be subject to City policies applicable to independent contractors.

D. Contractor may rely upon the accuracy of reports and surveys provided by the City, except when a defect should have been apparent to a reasonably competent professional or when Contractor has actual notice of a defect.

4. INDEPENDENT CONTRACTOR

A. The parties agree that at all times and for all purposes under the terms of this Agreement each party's relationship to any other party shall be that of an independent contractor. Each party is solely responsible for the acts of its own employees, agents, and servants. No liability, right, or benefit arising out of any employer-employee relationship, either express or implied, shall arise or accrue to any party as a result of this Agreement.

B. Contractor does not have any authority to execute any contract or agreement on behalf of the City, and is not granted any authority to assume or create any obligation or liability on the City's behalf, or to bind the City in any way.

5. COMPENSATION OF CONTRACTOR

A. The total amount of compensation paid to Contractor under this Agreement shall not exceed $0.00, which shall be paid upon invoice by Contractor to the City for services rendered according to the schedule in Exhibit B. Compensation of Contractor includes all reimbursable expenses unless a schedule of reimbursable expenses is included in an attached Exhibit B. Expenses outside those identified in the attached schedule must be approved in advance by the Contract Administrator.

B. Payment shall be made monthly following receipt of invoices submitted by Contractor and approved by the Contract Administrator, unless a different payment schedule is specified in Exhibit B.

C. Contractor shall be compensated for additional work or Services beyond those specified in this Agreement only when the scope of and compensation for the additional work or Services have received prior written approval of the Contract Administrator.

D. Contractor shall keep complete records of work performed (e.g. tasks performed, hours allocated, etc.) so that the City may verify invoices submitted by Contractor. Such records shall be made available to the City upon request and submitted in summary form with each invoice.

6. INSURANCE/INDEMNIFICATION

A. Contractor shall procure and maintain from the Effective Date or Commencement Date of this Agreement (whichever is earlier) through the conclusion of this Agreement, such insurance policies, including those required by this Agreement, as will protect itself and the City from all claims for bodily injury, death, or property damage that may arise under this Agreement; whether the act(s) or omission(s) giving rise to the claim were made by Contractor, Contractor's subcontractor, or anyone employed by Contractor or Contractor's subcontractor directly or indirectly. Prior to commencement of work under this Agreement, Contractor shall provide documentation to the City demonstrating Contractor has obtained the policies and endorsements required by this Agreement. Contractor shall provide such documentation in a form and manner satisfactory to the City. Currently, the City requires insurance to be submitted through its contractor, myCOI. Contractor shall add registration@mycoitracking.com to its safe sender's list so that it will receive necessary communication from myCOI. When requested, Contractor shall provide the same documentation for its subcontractors.

B. All insurance providers of Contractor shall be authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-authorized insurance companies are not acceptable unless approved in writing by the City.

C. To the fullest extent permitted by law, Contractor shall indemnify, defend, and hold the City and its officers, employees, and agents harmless from all suits, claims, judgments, and expenses, including attorney's fees, resulting or alleged to result, from an act or omission by Contractor or Contractor's employees or agents occurring in the performance or breach of this Agreement, except to the extent that any suit, claim, judgment, or expense are finally judicially determined to have resulted from the City's negligence, willful misconduct, or failure to comply with a material obligation of this Agreement. The obligations of this paragraph shall survive the expiration or termination of this Agreement.

D. Contractor is required to have the following minimum insurance coverage:

1. Professional Liability Insurance or Errors and Omissions Insurance protecting Contractor and its employees - $1,000,000.

2. Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 04 13 or current equivalent. The City of Ann Arbor shall be an additional insured. There shall be no added exclusions or limiting endorsements that diminish the City's protections as an additional insured under the policy.

$1,000,000	Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined
$2,000,000	Per project General Aggregate
$1,000,000	Personal and Advertising Injury

3. Worker's Compensation Insurance in accordance with all applicable state and federal statutes; also, Employers Liability Coverage for:

Bodily Injury by Accident - $500,000 each accident
Bodily Injury by Disease - $500,000 each employee
Bodily Injury by Disease - $500,000 each policy limit

4. Motor Vehicle Liability Insurance equivalent to, as a minimum, Insurance Services Office form CA 00 01 10 13 or current equivalent. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. The

City of Ann Arbor shall be an additional insured. There shall be no added exclusions or limiting endorsements that diminish the City's protections as an additional insured under the policy. The limits of liability shall be $1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined.

5. Umbrella/Excess Liability Insurance shall be provided to apply in excess of the Commercial General Liability, Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of $1,000,000.

E. Commercial General Liability Insurance and Motor Vehicle Liability Insurance (if required by this Agreement) shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance. Contractor agrees to waive any right of recovery by its insurer against the City for any insurance listed herein.

F. Insurance companies and policy forms are subject to approval of the City Attorney, which approval shall not be unreasonably withheld. Documentation must provide and demonstrate an unconditional and unqualified 30-day written notice of cancellation in favor of the City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number(s); name of insurance company; name(s), email address(es), and address(es) of the agent or authorized representative; name and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions, which may be approved by the City in its sole discretion; (c) that the policy conforms to the requirements specified. Contractor shall furnish the City with satisfactory certificates of insurance and endorsements prior to commencement of any work. If any of the above coverages expire by their terms during the term of this Agreement, Contractor shall deliver proof of renewal and/or new policies and endorsements to the Administering Service Area/Unit at least ten days prior to the expiration date.

7. WAGE AND NONDISCRIMINATION REQUIREMENTS

A. <u>Nondiscrimination</u>. Contractor shall comply, and require its subcontractors to comply, with the nondiscrimination provisions of MCL 37.2209. Contractor shall comply with the provisions of Section 9:158 of Chapter 112 of Ann Arbor City Code and assure that Contractor's applicants for employment and employees are treated in a manner which provides equal employment opportunity.

B. <u>Living Wage</u>. If Contractor is a "covered employer" as defined in Chapter 23 of Ann Arbor City Code, Contractor must comply with the living wage provisions of Chapter 23 of Ann Arbor City Code, which requires Contractor to pay those employees providing Services to the City under this Agreement a "living wage," as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3); to post a notice approved by the City of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Agreement are working; to maintain records of compliance; if requested by the City, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23.

8. REPRESENTATIONS AND WARRANTIES BY CONTRACTOR

A. Contractor warrants that the quality of Services shall conform to the level of quality performed by persons regularly rendering this type of service.

B. Contractor warrants that it has all the skills, experience, and professional and other licenses necessary to perform the Services.

C. Contractor warrants that it has available, or will engage at its own expense, sufficient trained employees to provide the Services.

D. Contractor warrants that it has no personal or financial interest in this Agreement other than the fee it is to receive under this Agreement. Contractor certifies that it will not acquire any such interest, direct or indirect, which would conflict in any manner with the performance of the Services. Contractor certifies that it does not and will not employ or engage any person with a personal or financial interest in this Agreement.

E. Contractor warrants that it is not, and shall not become overdue or in default to the City for any contract, debt, or any other obligation to the City, including real and personal property taxes. Further Contractor agrees that the City shall have the right to set off any such debt against compensation awarded for Services under this Agreement.

F. Contractor warrants that its bid or proposal for services under this Agreement was made in good faith, that it arrived at the costs of its proposal independently, without consultation, communication, or agreement for the purpose of restricting competition as to any matter relating to such costs with any competitor for these services; and no attempt has been made or will be made by Contractor to induce any other person or entity to submit or not to submit a bid or proposal for the purpose of restricting competition.

G. The person signing this Agreement on behalf of Contractor represents and warrants that they have express authority to sign this Agreement for Contractor and agrees to hold the City harmless for any costs or consequences of the absence of actual authority to sign.

H. The obligations, representations, and warranties of this section 8 shall survive the expiration or termination of this Agreement.

9. OBLIGATIONS OF THE CITY

A. The City shall give Contractor access to City properties and project areas as required to perform the Services.

B. The City shall notify Contractor of any defect in the Services of which the Contract Administrator has actual notice.

10. ASSIGNMENT

A. Contractor shall not subcontract or assign any portion of any right or obligation under this Agreement without prior written consent from the City. Notwithstanding any consent by the City to any assignment, Contractor shall at all times remain bound to all warranties, certifications, indemnifications, promises, and performances required of Contractor under the Agreement unless specifically released from the requirement in writing by the City.

B. Contractor shall retain the right to pledge payments due and payable under this Agreement to third parties.

11. TERMINATION OF AGREEMENT

A. If either party is in breach of this Agreement for a period of 15 days following receipt of notice from the non-breaching party with respect to the breach, the non-breaching party may pursue any remedies available against the breaching party under applicable law, including the right to terminate this Agreement without further notice. The waiver of any breach by any party to this Agreement shall not waive any subsequent breach by any party.

B. The City may terminate this Agreement, on at least 30 days' advance notice, for any reason, including convenience, without incurring any penalty, expense, or liability to Contractor, except the obligation to pay for Services actually performed under the Agreement before the termination date.

C. Contractor acknowledges that if this Agreement extends for several fiscal years, continuation of this Agreement is subject to appropriation of funds through the City budget process. If funds are not appropriated or otherwise made available, the City shall have the right to terminate this Agreement without penalty at the end of the last period for which funds have been appropriated or otherwise made available by giving written notice of termination to Contractor. The Contract Administrator shall give Contractor written notice of such non-appropriation within 30 days after the Contract Administrator has received notice of such non-appropriation.

D. The expiration or termination of this Agreement shall not release either party from any obligation or liability to the other party that has accrued at the time of expiration or termination, including a payment obligation that has already accrued and Contractor's obligation to deliver all Deliverables due as of the date of termination of the Agreement.

12. REMEDIES

A. This Agreement does not, and is not intended to, impair, divest, delegate, or contravene any constitutional, statutory, or other legal right, privilege, power, obligation, duty, or immunity of the parties.

B. All rights and remedies provided in this Agreement are cumulative and not exclusive, and the exercise by either party of any right or remedy does not preclude the exercise of any other rights or remedies that may now or subsequently be available at law, in equity, by statute, in any other agreement between the parties, or otherwise.

C. Absent a written waiver, no act, failure, or delay by a party to pursue or enforce any right or remedy under this Agreement shall constitute a waiver of that right with regard to any existing or subsequent breach of this Agreement. No waiver of any term, condition, or provision of this Agreement, whether by conduct or otherwise, shall be deemed or construed as a continuing waiver of any term, condition, or provision of this Agreement. No waiver by either party shall subsequently affect the waiving party's right to require strict performance of this Agreement.

13. NOTICE

All notices and submissions required under this Agreement shall be delivered to the respective party in the manner described herein to the address stated below or such other address as either party may designate by prior written notice to the other. Notices given under this Agreement shall be in writing and shall be personally delivered, sent by next day express delivery service, certified mail, or first class U.S. mail postage prepaid, and addressed to the person listed below. Notice will be deemed given on the date when one of the following first occur: (1) the date of actual receipt; (2) the next business day when notice is sent next day express delivery service or personal delivery; or (3) three days after mailing first class or certified U.S. mail.

If Notice is sent to Contractor:

[TBD]
ATTN: [TBD]
[TBD]
[TBD], [TBD] [TBD]

If Notice is sent to the City:

City of Ann Arbor
ATTN: [TBD]
301 E. Huron St.
Ann Arbor, Michigan 48104

With a copy to: The City of Ann Arbor
ATTN: Office of the City Attorney
301 East Huron Street, 3rd Floor
Ann Arbor, Michigan 48104

14. CHOICE OF LAW AND FORUM

This Agreement will be governed and controlled in all respects by the laws of the State of Michigan, including interpretation, enforceability, validity and construction, excepting the principles of conflicts of law. The parties submit to the jurisdiction and venue of the Circuit Court for Washtenaw County, State of Michigan, or, if original jurisdiction can be established, the United States District Court for the Eastern District of Michigan, Southern Division, with respect to any action arising, directly or indirectly, out of this Agreement or the performance or breach of this Agreement. The parties stipulate that the venues referenced in this Agreement are convenient and waive any claim of non-convenience.

15. OWNERSHIP OF DOCUMENTS

Upon completion or termination of this Agreement, all Deliverables prepared by or obtained by Contractor as provided under the terms of this Agreement shall be delivered to and become the property of the City. Original basic survey notes, sketches, charts, drawings, partially completed drawings, computations, quantities, and other data shall remain in the possession of Contractor as instruments of service unless specifically incorporated in a Deliverable, but shall be made available, upon request, to the City without restriction or limitation on their use. The City acknowledges that the documents are prepared only for the Services. Prior to completion of the Services the City shall have a recognized proprietary interest in the work product of Contractor.

16. CONFLICTS OF INTEREST OR REPRESENTATION

Contractor certifies it has no financial interest in the Services to be provided under this Agreement other than the compensation specified herein. Contractor further certifies that it presently has no personal or financial interest, and shall not acquire any such interest, direct or indirect, which would conflict in any manner with its performance of the Services under this Agreement.

Contractor agrees to advise the City if Contractor has been or is retained to handle any matter in which its representation is adverse to the City and to obtain the City's consent therefor. The City's prospective consent to Contractor's representation of a client in matters adverse to the City, as identified above, will not apply in any instance where, as the result of Contractor's representation, Contractor has obtained sensitive, proprietary, or otherwise confidential information of a non-public nature that, if known to another client of Contractor, could be used in any such other matter by the other client to the material disadvantage of the City. Each matter will be reviewed on a case by case basis.

17. SEVERABILITY OF PROVISIONS

Whenever possible, each provision of this Agreement will be interpreted in a manner as to be effective and valid under applicable law. However, if any provision of this Agreement or the application of any provision to any party or circumstance is prohibited by or invalid under applicable law, that provision will be ineffective to the extent of the prohibition or invalidity without invalidating the remainder of the provisions of this Agreement or the application of the provision to other parties and circumstances.

18. EXTENT OF AGREEMENT

This Agreement, together with all Exhibits constitutes the entire understanding between the City and Contractor with respect to the subject matter of the Agreement and it supersedes, unless otherwise incorporated by reference herein, all prior representations, negotiations, agreements, or understandings, whether written or oral. Neither party has relied on any prior representations in entering into this Agreement. No terms or conditions of either party's invoice, purchase order, or other administrative document shall modify the terms and conditions of this Agreement, regardless of the other party's failure to object to such terms or conditions. This Agreement shall be binding on and shall inure to the benefit of the parties to this Agreement and their permitted successors and permitted assigns and nothing in this Agreement, express or implied, is intended to or shall confer on any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of this Agreement. This Agreement may only be altered, amended, or modified by written amendment signed by Contractor and the City. This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall be deemed to be one and the same agreement.

19. ELECTRONIC TRANSACTION

The parties agree that signatures on this Agreement may be delivered electronically or by facsimile in lieu of an physical signature and agree to treat electronic or facsimile signatures as binding.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK; SIGNATURE PAGES FOLLOW]

[TBD]

By: ______________________________

Name: ______________________________

Title: ______________________________

Date: ______________________________

CITY OF ANN ARBOR

By: ___________________________

Name: Milton Dohoney Jr.

Title: City Administrator

Date: ___________________________

Approved as to substance:

By: ___________________________

Name: ___________________________

Title: ___________________________

Date: ___________________________

Approved as to form:

By: ___________________________

Name: Atleen Kaur

Title: City Attorney

Date: ___________________________

EXHIBIT A

Scope of Services

EXHIBIT B

Compensation