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LANDFILL BIOREACTOR PROGRAM 2002 ANNUAL REPORT OF MONITORING ACTIVITIES

KING GEORGE RECYCLING AND WASTE DISPOSAL FACILITY

King George County, Virginia
VADEQ Solid Waste Permit No. 586

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1. INTRODUCTION

1.1 Terms of Reference

The purpose of this semi-annual monitoring report is to present the 2002 calendar year results of the Landfill Bioreactor Program at the King George Recycling and Waste Disposal Facility (King George Landfill) in King George County, Virginia. The bioreactor study is being performed by Waste Management of Virginia, Inc. (a Waste Management, Inc. (WMI) company) under the United States Environmental Protection Agency's (USEPA's) Project XL program. This monitoring report was prepared for the Virginia Department of Environmental Quality (VADEQ) by Mr. Douglas T. Mandeville and Mr. Michael F. Houlihan, P.E., both of GeoSyntec Consultants (GeoSyntec), in accordance with the internal peer review policy of the firm.

1.2 Project Overview

The King George Landfill is located in King George County, Virginia, approximately 50 miles north-northeast of Richmond, Virginia. The waste disposal area will cover a total area of approximately 290 acres upon completion. Construction of the first cells started in 1996 and construction of additional liner area has been performed every year since. The King George Landfill was constructed having a geomembrane composite double-liner system, with primary leachate collection and leak detection (secondary collection) layers. The current configuration of Cells 1 through 4, including the recirculation trenches, is shown in Figure 1 and in Drawing 1. As part of the XL program, Cell 3 is operated as a bioreactor (i.e., leachate is recirculated), whereas Cells 1, 2, and 4 are operated as standard landfill cells (i.e., no leachate is recirculated). Cell 3 of the King George Landfill is referred to as the test area. Cells 1, 2, and 4 are referred to as the control area.

A landfill becomes a bioreactor when leachate and other liquids are added to the landfill. The purposes of operating a landfill as a bioreactor are to increase the rate of biodegradation in the landfill and to facilitate the management of leachate and other waste liquids. The original intent of the XL program was to recirculate all of the leachate generated at the site, plus an additional amount of non-hazardous liquids. The goal is to recirculate between 7 million and 8 million gallons of leachate and other non-hazardous liquids per year. This is approximately twice the typical leachate generation rate at King George. WMI will seek to recirculate this amount, while maintaining

compliance with applicable rules and regulations. At the time when the program was initially implemented, an increase in the occurrence of leachate seeps was observed, causing site personnel to reduce or curtail recirculation operations. In the interest of maintaining good landfill operating practices and complying with environmental protection regulations, the actual amount of leachate recirculated may be less than 8 million gallons per year. The amount of liquid applied to the waste will vary based on site inspections and observations. Regardless of the quantity of leachate recirculated, the requirement to perform monitoring during the course of the program will continue.

It is anticipated that the operation of Cell 3 as a bioreactor will result in several environmental and cost saving benefits including, but not limited to, the following: (i) decreased leachate management costs; (ii) increased landfill disposal capacity; (iii) reduced period of landfill gas generation; and (iv) improved long-term leachate quality. These benefits are discussed in depth in WMI's Project XL application [GeoSyntec, 2000].

The performance of the landfill is evaluated based on measurements of critical chemical and physical parameters associated with the solids, liquids, and gasses obtained from the test and control areas. Parameters to be measured include: settlement, leachate quantity, leachate quality, in-place density of waste, and air quality. The parameters measured in the bioreactor (i.e., test area) are compared to similar parameters measured from the control portion of the landfill.

1.3 Monitoring Program

As shown in Table 1, the monitoring activities at the King George Landfill consist of tracking the quality and quantity of leachate, landfill gas, and solid waste in the test and control areas. Detailed monitoring activities for the Landfill Bioreactor Program are described in the document entitled, *"Monitoring, Sampling, and Analysis Plan"* (Monitoring Plan) [GeoSyntec, 2001], which is contained in the permit application submitted to VADEQ. As part of the USEPA Project XL and VADEQ permit requirements, a series of site-specific rules and monitoring requirements have been developed. The USEPA site-specific rule appeared in the Federal Register on 18 July 2002. These requirements are addressed in Section 2 of this report. The VADEQ site-specific permit requirements appeared in the state permit modification issued for the site on 18 July 2002, these requirements are addressed in Section 3 of this report. Table 1

also shows the schedule followed for the 2002 monitoring events. Table 2 summarizes the dates and the sampling events that occurred in 2002. The purpose of the leachate monitoring events is to collect leachate samples from the control area and the test area for subsequent laboratory analysis. The purpose of the landfill gas monitoring events is to measure the landfill gas composition at the wellheads in the control and test areas, obtain landfill gas composition samples from the landfill gas collection system, and perform a surface scan to measure surface emissions in the test and control areas. The purpose of the solid waste monitoring events is to obtain waste samples from the test and control areas for subsequent laboratory analysis. In addition to these field monitoring events, the volume of leachate collected, the volume of leachate recirculated, and landfill settlement are monitored for both the test and control areas.

The purpose of the monitoring program is to evaluate the performance of the landfill bioreactor throughout the duration of the project. The evaluation is based on the following performance criteria:

- leachate quality and quantity;
- landfill gas quality and quantity; and
- solid waste decomposition/stabilization.

The manner in which these criteria are being evaluated is described in the following three subsections.

Leachate Quality and Quantity

Sampling activities were conducted in both the test area and control area, allowing for the anticipated relative improvement in performance to be evaluated. Leachate sampling was conducted in Cells 1, 2, 3, and 4 according to the frequency described in Table 1. Leachate samples were collected by filling the appropriate sample bottles directly from the sampling ports from the primary leachate collection system for the respective cell being sampled. The sampling ports for each of the primary leachate collection systems are located within the vault/riser house of the leachate collection system for each cell. The specific parameters measured, and the associated test methods are provided in Table 3. Several key parameters that indicate the waste composition and the presence of biological processes in the landfill have been identified (Pohland and Harper, 1986) and are presented in detail in this report. These parameters include: (i) Biological Oxygen Demand (BOD); (ii) Chemical Oxygen Demand (COD);

(iii) Total Organic Carbon (TOC); (iv) Chloride; (v) Sulfate; (vi) Nitrate Nitrogen; (vii) Ammonia Nitrogen, and (viii) pH.

In addition to evaluating the leachate quality in the landfill over time, the amount of liquid added to the system and the amount of leachate collected in the primary and secondary leachate collection systems was recorded.

Landfill Gas Quality and Quantity

Measurements of landfill gas quality were obtained during field monitoring events at existing landfill gas probes, as part of the surface emissions monitoring, and the collection of composite landfill gas samples from the landfill gas collection system. The parameters measured and the test methods for the landfill gas monitoring and sampling are described in the Monitoring Plan [GeoSyntec, 2001].

Landfill gas monitoring was performed at each of the existing installed gas wells to monitor activity within the test and control areas. Measurements of methane (CH_4), oxygen (O_2), carbon dioxide (CO_2), temperature, and flow rate was obtained from each gas well using portable field instruments, (i.e., a Landtech, Inc. GEM 2000). Hydrogen sulfide (H_2S) measurements were obtained using a VRAE specific gas monitor calibrated to a known standard for H_2S.

Surface emissions monitoring was performed in accordance with the requirements specified by the New Source Performance Standards (NSPS) and Emissions Guidelines (EG) for MSW landfills [40 CFR 60.755]. Methane concentrations were measured within 5 to 10 centimeters (2 to 4 inches) from the landfill surface.

Composite landfill gas samples were obtained from the landfill gas collection system. These landfill gas samples obtained for non methane organic compounds (NMOC) were obtained in accordance with the requirements of USEPA Method 25 and samples obtained for volatile organic compounds were obtained in accordance with USEPA Method TO-14.

Solid Waste Decomposition/Stabilization

To evaluate the composition of the solid waste, a series of borings was drilled in the test and control areas in 2001. Samples of the solid waste were obtained from these

borings. The parameters evaluated from these solid waste samples include: (i) moisture content; (ii) cellulose; (iii) lignin; (iv) pH; and (v) biochemical methane potential.

To evaluate waste settlement in both the bioreactor area and the control area, a series of topographic surveys of the test and control areas were conducted.

1.4 Report Organization

In this report, the results of the analytical tests conducted during calendar year 2002 are provided. The organization of this report is described below.

- Section 2 addresses the Federal Register site specific rule making.
- Section 3 presents the requirements of the VADEQ Experimental Permit.
- Section 4 describes the sampling and sampling and analysis activities performed during calendar year 2002.
- Section 5 describes the analytical test results and other data collected during the 2002 calendar year.
- Section 6 presents closing conclusions.
- Section 7 provides references.
- Appendix A presents the leachate laboratory analysis results.
- Appendix B presents the liquid application logs.
- Appendix C presents the landfill survey data.
- Appendix D presents landfill gas data.

2. REQUIREMENTS OF FEDERAL REGISTER SITE SPECIFIC RULE MAKING

On July 18, 2002, the EPA promulgated a site-specific rule to implement this project under the USEPA's Project Excellence and Leadership Program (Project XL). This rule was published in the Federal Register and provides site-specific regulatory flexibility under the Resource Conservation and Recovery Act (RCRA) for the King George Landfill. Part 258, Subpart D of the rule identifies 14 conditions that are to be met while leachate is recirculated at the King George Landfill. The remainder of this section addresses 12 of these conditions; the remaining two conditions are related to the duration of and compliance with the site specific rule.

1) *Item 1 relates to the integrity of the liner system and maintaining less than 30 cm of head on the liner system.* In accordance with Item 1, the integrity of the liner system was maintained during construction of the recirculation trenches and the leachate collection system has been maintained in good operating conditions. To date, the leachate collection records in the test and control areas do not indicate an increase in the leakage rate through the primary liner system. There is no apparent slippage of the liner system based on daily observations at the site. It should be noted that design calculations that estimate the amount of head on the liner system indicated that up to 7 to 8 million gallons of liquid per year could be added to the test area (approximately 10 acres) and that the head on the liner system would remain less than 30 cm. The liquid application rate is approximately 6.8 million gallons per year based on data collected between November 1, 2002 and December 31, 2002. Therefore, the head on the liner system is expected to be less than 30 cm.

2) *Item 2 relates to the Code of Federal Regulations (CFR) Section 258.40.* In accordance with Item 2, the groundwater quality has been monitored and analyzed at the compliance point. Arsenic, Cadmium, and Lead have been detected at concentrations that exceed the current MCL; however, it is noted that the detected concentrations were less than the facility background concentrations at the time of detection. Consequently, the concentrations did not represent statistically significant concentrations and the monitoring program at the King George Landfill, Permit No. 586, was allowed to continue in the Detection Monitoring Program.

3) *Item 3 relates to the occurrence of seeps at the landfill.* Surface seeps have occurred at the King George Landfill after leachate recirculation operations started. These seeps are most likely attributed to the leachate recirculation operations at the site. In accordance with Item 3, WMI is in the process of identifying operating procedures that minimize the occurrence of seeps. Because WMI will operate the King George Landfill in an environmentally responsible manner, the amount of leachate that is recirculated may need to be reduced. Hence, the actual amount of leachate recirculated may be less than the target amount of 8 million gallons per year.

4) *Item 4 relates to the leachate quality parameters to be analyzed as part of this project.* In accordance with Item 4, the evaluation of the key leachate quality parameters occurred at the frequency presented in the Final Project Agreement [GeoSyntec, 2000] and the VADEQ state permit [GeoSyntec, 2001]. The test results are discussed in Section 5.1. It should be noted that these parameters (or groups of parameters) have been analyzed in leachate samples collected from the test and control areas. A complete set of laboratory results is presented in Appendix A (copies are available upon request).

5) *Item 5 relates to the quantity of leachate applied to the test area and the amount of leachate collected in the test and control areas of the landfill.* These issues are discussed in Section 5.1.

6) *Item 6 relates to an initial characterization of the liquid that was added to the test area.* In accordance with Item 6, an initial characterization of the leachate added to the landfill was performed in September 2002. The results of this characterization are discussed in Section 5.1.

7) *Item 7 relates to the occurrence of landfill fires in the test area and the measurement of gas temperature at the wellheads.* In accordance with Item 7, the test area at King George has been operated in a manner to prevent landfill fires from occurring. The gas temperature at the wellheads is discussed in Section 5.2.

8) *Item 8 relates to topographic surveys at the site.* In accordance with Item 8, one topographic survey was performed in 2002. The survey was conducted in November 2002. Because only one survey was conducted at the King George, settlements cannot be calculated at this time.

9) *Item 9 relates to odor complaints resulting from liquid application events.* No odor complaints associated with the liquid application events were recorded at King George.

10) *Item 10 relates to an initial waste characterization in the test area of the landfill.* In accordance with Item 10, a total of 5 borings were drilled in the summer of 2001. Two of these borings were in the control area and three were in the test area. The results of the laboratory testing of these solid waste samples are discussed in Section 5.3.

11) *Item 11 relates to the preparation of semi-annual reports to the EPA Regional Administrator.* In accordance with Item 11, this report serves as the first semi-annual monitoring report. The second report will be submitted on July 18, 2003.

12) *Item 12 relates additional monitoring related to the landfill gas.* In accordance with Item 12, the monitoring requirements for the New Source Performance Standards and the Title V Air Permit for the site were met. Copies of the wellhead monitoring results and the surface scans are presented in Appendix E.

3. REQUIREMENTS OF VADEQ EXPERIMENTAL PERMIT

On July 18, 2002, the state issued a permit modification allowing bioreactor operations in Phases 1 and 2 at the King George Landfill. Permit module I.F. of the permit amendment issued July 18, 2002, identifies several site specific conditions that must be met while leachate is recirculated at King George. The remainder of this section addresses each of these conditions.

1) *Item I.F.1 relates to the issuance of a Certificate to Operate.* Construction of the liquid application trenches was completed within 180 days of the issuance of the permit amendment. A renewal letter to continue recirculation operations will be submitted in July 2003.

2) *Item I.F.2 relates to the expiration of the experimental permit and request for a full permit amendment.* This report presents the first four months of bioreactor operations. At this time, there is not enough data available to draw conclusions from the experiment. If the project is found to be a success, WMI anticipates submitting a request for a full permit amendment.

3) *Item I.F.3 relates to the permitted landfill bioreactor area, Phases 1 and 2.* In accordance with the permit requirements, the liquid application trenches were constructed in Cell 3, and liquid was applied only in this part of the landfill.

4) *Item I.F.4 relates to the monitoring, sampling, and reporting requirements.* In accordance with Item I.F.4, the monitoring was completed as identified in Permit Attachment IIB-2. This report serves as the first quarterly report; the next quarterly report will be provided in May 2003.

5) *Item I.F.5 relates to the Title V Air Permit Issued January 10, 2002 and the New Source Performance Standards Subpart WWW.* In accordance with Item I.F.5, WMI complied with the regulations identified in the Title V Air Permit and the New Source Performance Standards Subpart WWW.

6) *Item I.F.6 relates to the characterization of leachate as a hazardous waste and the Virginia Hazardous Waste Management Regulations (9 VAC 20-60-*

10). In accordance with Item I.F.6, WMI managed leachate as required by the Virginia Hazardous Waste Management Regulations.

7) *Item I.F.7 relates to the monitoring of leachate head over the liner at its lowest disposal point to ensure that no more than 1 foot of head of leachate accumulated over the liner.* In accordance with Item I.F.7, WMI monitored the hydraulic head in Cell 3 at King George.

8) *Item I.F.8 relates to the closure of the bioreactor landfill area.* At this time, WMI plans to continue bioreactor operations in Cell 3 at King George. In accordance with Item I.F.8, WMI will notify VADEQ at least 180 days prior to the anticipated date of closing.

4. SAMPLING AND ANALYSIS ACTIVITIES

4.1 Introduction

The overall monitoring and sampling program was implemented by GeoSyntec with sampling performed by Joyce Engineering (Joyce) and WMI site personnel.

4.2 Field Sampling Activities

4.2.1 Leachate Quality

Leachate samples from the test and control areas were obtained by Joyce on the dates presented in Table 2. The leachate samples were collected from sumps in Cells 1, 2, 3, 4, as well as the leachate storage tank. The leachate samples were collected using the field sampling procedures described in the Monitoring Plan contained in the permit application for leachate recirculation at the site [GeoSyntec, 2001].

4.2.2 Landfill Gas Quality

The landfill gas samples were collected using the procedures described in the Monitoring Plan contained in the permit application for leachate recirculation at the site [GeoSyntec, 2001]. The landfill gas composition in the wellheads in the test and control areas were tested for the percentages of oxygen, carbon dioxide, methane, flow rate, and temperature. The landfill gas composition at the wellheads is summarized in Table 4. A surface emissions scan was conducted in the test and control areas, and a series of composite landfill gas samples were obtained from the landfill gas collection system.

4.2.3 Solid Waste Sampling

Prior to construction of the leachate recirculation system, a series of exploratory borings were drilled in both the test and control areas. Samples of solid waste were collected from a variety of depths at each boring location.

4.3 Laboratory Analysis Program

4.3.1 Leachate Quality

The leachate samples obtained during the Field Sampling Activities were sent to Severn Trent Laboratories, Inc. and were tested for the parameters listed in Table 3. A summary of the key parameters identified in Section 1.3 are presented in Table 5. Copies of the laboratory analytical results are presented in Appendix A.

4.3.2 Landfill Gas Quality

The landfill gas samples from the header pipes in the landfill gas collection system were sent to Triangle Environmental Services for laboratory analysis. These landfill gas samples were tested in accordance with USEPA method TO-14. Copies of these results are presented in Appendix D.

4.3.3 Solid Waste Composition

The solid waste samples collected during the field activities were sent to Virginia Tech and were analyzed for moisture content, lignin, cellulose, pH, and biochemical methane potential.

4.4 Other Data

4.4.1 Leachate Generation Quantities

Leachate flow was measured bi-weekly in Cells 1, 2, 3, and 4 by site personnel using flowmeters that are installed in the leachate riser vaults near each cell. The leachate generation quantities for each cell are presented in Table 6.

4.4.2 Quantity of Liquid Applied to Landfill

The amount of liquid added to each trench was recorded by site personnel. The current trench configuration is shown in Figure 1. In general, liquid was added to each

trench approximately every three days. A summary of the liquid added to the test area is presented in Table 7.

4.4.3 Landfill Settlement

A series of topographic surveys of the test and control areas has been performed by Flora Surveying. An approximately 100-ft grid system was established, with the elevation measured at the same locations over time. A summary table containing the point identification number, northing, easting, and elevations at the initial survey date is presented in Table 8. The survey grid is shown on Drawing 2.

5. DATA ANALYSIS

5.1 Leachate Quality and Quantity

Figure 2 shows the liquid added to the test area, and the target rate of 7 million to 8 million gallons per year (583,333 to 666,666 gallons per month). The average daily application rate is approximately 18,000 gallons per day. The total amount of leachate applied to the landfill during 2002 was 1,132,053 gallons. During the first two months of operation, the liquid application system was operating close to the target of between 1,166,666 and 1,333,333 gallons (583,333 to 666,666 gallons per month for two months).

The average amount of leachate collected in the test and control areas prior to the operation of the liquid application system was approximately 18,050 gallons per month and 36,103 gallons per month, respectively. In November 2002, approximately 66,900 gallons of leachate was collected in the test area and an average of 104,100 gallons of leachate was collected in the control area.

Because the program is still in its initial stages, there is not enough data to identify trends in the leachate quality results. However, in reviewing the key leachate parameters in Table 5, several items are apparent. The analyses of the background leachate quality samples (dated September 27, 2002) are within typical ranges for landfill leachate. The monthly leachate samples (dated October, November, and December) indicate values of biological oxygen demand (BOD) value the lower range of typical landfill leachate. Table 5 shows a range between approximately 50 mg/l and 1,100 mg/l; typical values range from 20 mg/l to 35,000 mg/l [Kjeldsen et al., 2002].

Figures 3 through 8 show variation with time in the BOD to COD ratio, COD to TOC ratio chloride, nitrate, nitrogen, ammonia, and pH, respectively. These figures represent the key leachate parameters identified in Table 5. Because of the limited amount of data collected so far, trends in the data cannot be identified.

5.2 Landfill Gas Quality and Quantity

Table 4 summarizes the landfill gas composition and temperature measured at the wellheads. The wellheads are identified as being located in the test or control areas.

The temperatures measured at the wellheads are within normal ranges; this indicates that there are no landfill fires within the test or control areas.

The trends in the landfill gas quantity for the gas wells in the test and control areas are shown in Figure 9. Several of the gas wells in the test area (i.e., wells GW-18, GW-21, and GW-22) and in the control area (i.e., wells GW-6 and GW-10) show an increase in the flow rate. Because this trend is noted for wells in both the test and control areas, the increase in landfill gas quantity does not appear to be related to the bioreactor operations at this time.

Figure 10 shows the percentage methane in the landfill gas at the wells in the test and control areas. The percentage of methane present in the landfill gas appears to have remained relatively constant over the first two months of operation at the site. At this time, there does not appear to be a clear difference between the percentage methane present in the landfill gas in the test or control areas.

Figure 11 shows the percentage carbon dioxide in the landfill gas at the wells in the test and control areas. With the exception of Well GW-26, the percentage carbon dioxide present in the landfill gas wells has remained relatively constant. At this time, there does not appear to be a clear difference between the percentage carbon dioxide present in the landfill gas in the test and control areas.

5.3 Solid Waste

Table 9 summarizes the baseline solid waste sampling results from the field work conducted in the summer of 2001. These results appear to be fairly typical for MSW. Future comparisons will be made as subsequent solid waste samples are obtained from the test and control areas.

6. CONCLUSIONS

This report has provided a summary of the monitoring activities at the King George Landfill as part of the leachate recirculation operations conducted under the USEPA's XL Program. Because the program is only in its initial stages, conclusions regarding the performance of the test area at the King George Landfill cannot be provided at this time. However, based on the experience gained during the design, permitting, construction processes, and initial start up of the program, the following comments are offered.

- The cost and operational benefits of bioreactor technology can be substantial at sites that transport leachate from the site to a leachate treatment facility and/or have a high cost of leachate treatment. The direct cost savings at this bioreactor test site, for example, have been sufficient to pay for the entire capital cost of the program in the first year, as well as first-year operational costs. In addition, indirect cost benefits are expected in the future as decomposition-induced settlement provides additional disposal capacity.
- Bioreactor or leachate recirculation operations should be phased-in at sites to allow the operator to adjust to the specific requirements for operating the system. For example, specific attention to operation of the liquid application system is required each day; for large sites that recirculate all of the leachate generated, this could require as much as one-half to one full laborer each day.
- Careful attention is required during system start-up to minimize or eliminate problems such as leachate seeps or odor problems. Because waste composition varies from location to location, calculation of leachate recirculation rates should be used for preliminary trench sizing. Actual performance of liquid application trenches should be determined by in-situ observation.

A summary of the monitoring activities planned for 2003 is presented in Table 10.

7. REFERENCES

GeoSyntec Consultants "*Project XL – Final Project Agreement for Landfill Bioreactor Systems – King George County Landfill and Recycling Center and King George Recycling and Waste Disposal Facility*", dated 28 September 2000.

GeoSyntec Consultants "*Landfill Bioreactor Project Application for Permit Amendment for Experimental Permit,*" King George Recycling and Waste Disposal Facility, dated 19 September 2001.

Kjeldsen, P., Barlaz, M.P., Rooker, A.P., Baun, A., Ledin, A., and Christensen, T.H., "*Present and Long-Term Composition of MSW Landfill Leachate: A Revie*w", Critical Reviews in Environmental Science and Technology, 32 (4), p. 297-336.

Pohland, F.G., and Harper, S.R., 1986, "*Critical Review and Summary of Leachate and Gas Production From Landfills*", EPA/600/2-86/073, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Title 40, Code of Federal Regulations, Part 60.

TABLE 1
2002 MONITORING CALENDAR
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

Month

	Monitoring Parameters	Responsible Party	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. LEACHATE	Chemical parameters measured on site	WM personnel									B	X	X	X
	Physical parameters measured on site	WM personnel									B	X	X	X
	Chemical parameters sampled on site from test area	Sampled by subcontractor, tested offsite by Geochemical									B	X	X	X
	Chemical parameters sampled on site from storage tanks	Sampled by subcontractor, tested offsite by Geochemical									B	X		
2. LANDFILL GAS	Landfill gas composition measured	WM personnel									B	X	X	X
	Physical parameters measured on site	WM personnel									B	X	X	X
	Chemical parameters	WM personnel, testing by subcontractor									B	X		
	Surface landfill gas measured on site	Subcontractor									B	X	X	X
3. SOLID WASTE	Survey, on site	Subcontractor									B	X		X
	Solid waste stabilization and decomposition	WM personnel									B	X		

Note: 'B' represents background monitoring events, 'X' represents monitoring events.

TABLE 2
SUMMARY OF SAMPLING ACTIVITIES
Project XL
King George County Landfill and Recycling Center
King George, Virginia

Date	Sampling Event
9/27/2002	Background leachate sampling
9/30/2002	Background landfill gas sampling
10/9/2002	Background landfill gas sampling
10/28/2002	Background leachate sampling
11/11/2002	Topographical site survey
11/14/2002	Monthly landfill gas sampling
11/25/2003	Monthly leachate sampling
12/18/2002	Monthly landfill gas sampling
12/19/2003	Monthly leachate sampling

TABLE 3
LEACHATE ANALYSIS PARAMETERS
Project XL
King George County Landfill and Recycling Center
King George, Virginia

Parameter	Method	Parameter	Method
Cadmium	EPA 200.7	Bromochloromethane	EPA 8260B
Potassium	EPA 200.7	Bromomethane	EPA 8260B
Chloride	EPA 325.2	Carbon Disulfide	EPA 8260B
Ammonia Nitrogen	EPA 350.1	Carbon Tetrachloride	EPA 8260B
Total Kjeldahl Nitrogen	EPA 351.3	Chlorobenzene	EPA 8260B
Nitrate Nitrogen	EPA 353.2	Chlorodibromomethane	EPA 8260B
Phosphorus, ortho	EPA 365.2	Chloroethane	EPA 8260B
Phosphorus, total	EPA 365.2	Chloromethane	EPA 8260B
Sulfate	EPA 375.4	cis-1,2-Dichloroethene	EPA 8260B
Arsenic	EPA 6010 B	cis-1,3-Dichloropropene	EPA 8260B
Barium	EPA 6010 B	Dibromomethane	EPA 8260B
Chromium	EPA 6010 B	Dichlorobromomethane	EPA 8260B
Lead	EPA 6010 B	Dichlorodifluoromethane	EPA 8260B
Selenium	EPA 6010 B	Ethyl Methacrylate	EPA 8260B
Silver	EPA 6010 B	Ethylbenzene	EPA 8260B
Mercury	EPA 7470	Iodomethane	EPA 8260B
1,2-Dibromo-3-chloropropane	EPA 8011	Methacrylonitrile	EPA 8260B
1,2-Dibromoethane	EPA 8011	Methyl Ethyl Ketone	EPA 8260B
1,1,1,2-Tetrachloroethane	EPA 8260B	Methyl methacrylate	EPA 8260B
1,1,1-Trichloroethane	EPA 8260B	Methylene Chloride	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 8260B	Propionitrile	EPA 8260B
1,1,2-Trichloroethane	EPA 8260B	Styrene	EPA 8260B
1,1-Dichloroethane	EPA 8260B	Tetrachloroethene	EPA 8260B
1,1-Dichloroethene	EPA 8260B	Toluene	EPA 8260B
1,1-Dichloropropene	EPA 8260B	Total Xylene	EPA 8260B
1,2,3-Trichloropropane	EPA 8260B	trans-1,2-Dichloroethene	EPA 8260B
1,2-Dichlorobenzene	EPA 8260B	trans-1,3-Dichloropropene	EPA 8260B
1,2-Dichloroethane	EPA 8260B	trans-1,4-Dichloro-2-butene	EPA 8260B
1,2-Dichloropropane	EPA 8260B	Tribromomethane	EPA 8260B
1,3-Dichlorobenzene	EPA 8260B	Trichloroethene	EPA 8260B
1,3-Dichloropropane	EPA 8260B	Trichlorofluoromethane	EPA 8260B
1,4-Dichlorobenzene	EPA 8260B	Trichloromethane	EPA 8260B
2,2-Dichloropropane	EPA 8260B	Vinyl Acetate	EPA 8260B
2-chloro-1,3-butadiene	EPA 8260B	Vinyl Chloride	EPA 8260B
2-Hexanone	EPA 8260B	1,2,4,5-Tetrachlorobenzene	EPA 8270C
2-Methyl-1-propanol	EPA 8260B	1,2,4-Trichlorobenzene	EPA 8270C
3-Chloro-1-Propene	EPA 8260B	1,3-Dinitrobenzene	EPA 8270C
4-Methyl-2-Pentanone	EPA 8260B	1,4-Naphthoquinone	EPA 8270C
Acetone	EPA 8260B	1-Naphthylamine	EPA 8270C
Acetonitrile	EPA 8260B	1-Nitrosopiperidine	EPA 8270C
Acrolein	EPA 8260B	2,3,4,6-Tetrachlorophenol	EPA 8270C
Acrylonitrile	EPA 8260B	2,4,5-Trichlorophenol	EPA 8270C

TABLE 3 (continued)
LEACHATE ANALYSIS PARAMETERS

Parameter	Method	Parameter	Method
Benzene	EPA 8260B	2,4,6-Trichlorophenol	EPA 8270C
2,4-Dichlorophenol	EPA 8270C	Dibenzofuran	EPA 8270C
2,4-Dimethylphenol	EPA 8270C	Diethyl Phthalate	EPA 8270C
2,4-Dinitrophenol	EPA 8270C	Dimethoate	EPA 8270C
2,4-Dinitrotoluene	EPA 8270C	Dimethyl Phthalate	EPA 8270C
2,6-Dichlorophenol	EPA 8270C	Di-N-Butyl Phthalate	EPA 8270C
2,6-Dinitrotoluene	EPA 8270C	Di-N-Octylphthalate	EPA 8270C
2-Acetylaminofluorene	EPA 8270C	Di-n-propylnitrosamine	EPA 8270C
2-Chloro-Naphthalene	EPA 8270C	Diphenylamine	EPA 8270C
2-Chlorophenol	EPA 8270C	Disulfoton	EPA 8270C
2-Methyl-4,6-dinitrophenol	EPA 8270C	Ethyl Methanesulfonate	EPA 8270C
2-Methylnaphthalene	EPA 8270C	Famphur	EPA 8270C
2-Naphthylamine	EPA 8270C	Fluoranthene	EPA 8270C
2-Nitroaniline	EPA 8270C	Fluorene	EPA 8270C
2-Nitrophenol	EPA 8270C	Hexachlorobenzene	EPA 8270C
3,3-Dichlorobenzidine	EPA 8270C	Hexachlorobutadiene	EPA 8270C
3,3'-Dimethylbenzidine	EPA 8270C	Hexachlorocyclopentadiene	EPA 8270C
3-Methylcholanthrene	EPA 8270C	Hexachloroethane	EPA 8270C
3-Nitroaniline	EPA 8270C	Hexachloropropene	EPA 8270C
4-Aminobiphenyl	EPA 8270C	Indeno(1,2,3-cd)pyrene	EPA 8270C
4-Bromophenylphenylether	EPA 8270C	Isodrin	EPA 8270C
4-Chloro-3-methylphenol	EPA 8270C	Isophorone	EPA 8270C
4-Chloroaniline	EPA 8270C	Isosafrole	EPA 8270C
4-Chlorophenylphenylether	EPA 8270C	m,p-Cresol	EPA 8270C
4-Nitroaniline	EPA 8270C	Methapyrilene	EPA 8270C
4-Nitrophenol	EPA 8270C	Methyl Methanesulfonate	EPA 8270C
5-Nitro-o-toluidine	EPA 8270C	Methyl Parathion	EPA 8270C
7,12Dimethylbenz(a)-anthracene	EPA 8270C	Naphthalene	EPA 8270C
Acenaphthene	EPA 8270C	Nitrobenzene	EPA 8270C
Acenaphthylene	EPA 8270C	N-Nitrosodibutylamine	EPA 8270C
Acetophenone	EPA 8270C	N-Nitrosodiethylamine	EPA 8270C
Anthracene	EPA 8270C	n-Nitrosodimethylamine	EPA 8270C
Benzo(a)anthracene	EPA 8270C	n-Nitrosodiphenylamine	EPA 8270C
Benzo(a)pyrene	EPA 8270C	N-Nitrosomethylethylamine	EPA 8270C
Benzo(b)fluoranthene	EPA 8270C	N-Nitrosopyrrolidine	EPA 8270C
Benzo(ghi)perylene	EPA 8270C	o,o,o-Triethylphosphothioate	EPA 8270C
Benzo(k)fluoranthene	EPA 8270C	o-Cresol	EPA 8270C
Benzyl Alcohol	EPA 8270C	o-Toluidine	EPA 8270C
bis(2-Chloroethoxy)methane	EPA 8270C	Parathion	EPA 8270C
bis(2-Chloroethyl)ether	EPA 8270C	p-Dimethylaminoazobenzene	EPA 8270C
bis(2-Chloroisopropyl)ether	EPA 8270C	Pentachlorobenzene	EPA 8270C
bis(2-Ethylhexyl)phthalate	EPA 8270C	Pentachloronitrobenzene	EPA 8270C
Butyl benzylphthalate	EPA 8270C	Phenacetin	EPA 8270C
Chlorobenzilate	EPA 8270C	Phenanthrene	EPA 8270C
Chrysene	EPA 8270C	Phenol	EPA 8270C

TABLE 3 (continued)
LEACHATE ANALYSIS PARAMETERS

Parameter	Method	Parameter	Method
Diallate	EPA 8270C	Phorate	EPA 8270C
Dibenzo(a,h)anthracene	EPA 8270C	p-Phenylenediamine	EPA 8270C
Pronamide	EPA 8270C	Endrin Aldehyde	EPA 8081
Pyrene	EPA 8270C	Gamma BHC (Lindane)	EPA 8081
Safrole	EPA 8270C	Heptachlor	EPA 8081
sym-Trinitrobenzene	EPA 8270C	Heptachlor epoxide	EPA 8081
Thionazin	EPA 8270C	Methoxychlor	EPA 8081
Chemical Oxygen Demand	HACH 8000	Toxaphene	EPA 8081
Total dissolved solids	SM 2540C	2,4,5-T	EPA 8151A
Nitrite Nitrogen	SM 4500-NO2B	2,4-D	EPA 8151A
BOD 5-day	SM 5210B	Dinoseb	EPA 8151A
Total Organic Carbon	SM 5310C	Pentachlorophenol	EPA 8151A
Aldrin	EPA 8081	Silvex	EPA 8151A
Alpha BHC	EPA 8081	Pyruvic	
Beta BHC	EPA 8081	Lactic	
Chlordane	EPA 8081	Formic	
DDD	EPA 8081	Acetic	
DDE	EPA 8081	Proprionic	
DDT	EPA 8081	Butyric	
Delta BHC	EPA 8081		
Dieldrin	EPA 8081		
Endosulfan I	EPA 8081		
Endosulfan II	EPA 8081		
Endosulfan Sulfate	EPA 8081		
Endrin	EPA 8081		

Note

This list of parameters was developed from the Monitoring, Sampling, and Analysis Report included in the permit amendment submitted in October 2001.

TABLE 4
LANDFILL GAS DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

Flare

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	-	-	-	-
Flow Rate (scfm)	-	1980	1882	683
Methane (%)	-	48.6	46	47.3
Carbon Dioxide (%)	-	37.3	33.5	35.5
Oxygen (%)	-	2	4	3.4
Balance (%)	-	12.1	16.5	13.8

LFG Well GW-1 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	114	116	116	115
Flow Rate (scfm)	-	-	20	20
Methane (%)	51.4	45.8	40.9	52
Carbon Dioxide (%)	32.8	35.7	31.1	39.9
Oxygen (%)	3.8	2.3	4.5	0.2
Balance (%)	12	16.2	23.5	7.9

LFG Well GW-1A (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	124	112	115	113
Flow Rate (scfm)	-	-	-	-
Methane (%)	44.9	56.2	59.8	51
Carbon Dioxide (%)	30.5	40.7	40.7	36.2
Oxygen (%)	5.1	0	0	2.2
Balance (%)	19.5	3.1	0	10.6

LFG Well GW-2 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	108	112	112	115
Flow Rate (scfm)	-	-	37	28
Methane (%)	54	45	46.8	53
Carbon Dioxide (%)	34.7	36.2	34.2	39.9
Oxygen (%)	2.2	1.2	3.3	0.9
Balance (%)	9.1	17.6	15.7	6.2

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-2A (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	112	112	112	109
Flow Rate (scfm)	-	-	-	-
Methane (%)	63.9	44.2	58.1	58.3
Carbon Dioxide (%)	34.8	33.7	41.9	40.5
Oxygen (%)	1.1	3.7	0	0.4
Balance (%)	0.2	18.4	0	0.8

LFG Well GW-3 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	97	92	80	85
Flow Rate (scfm)	-	-	-	1
Methane (%)	55.5	46.5	49.7	43.7
Carbon Dioxide (%)	38.5	36.1	38.9	31.8
Oxygen (%)	0.1	1.2	0.1	3.8
Balance (%)	5.9	16.2	11.3	20.7

LFG Well GW-3A (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	120	118	112	118
Flow Rate (scfm)	-	-	-	-
Methane (%)	51.5	53.1	58.3	54
Carbon Dioxide (%)	33.3	38.9	41.1	42.9
Oxygen (%)	3.7	0	0	0
Balance (%)	11.5	8	0.6	3.1

LFG Well GW-4 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	97	102	97	90
Flow Rate (scfm)	-	-	-	-
Methane (%)	57.3	45.7	53.2	54.8
Carbon Dioxide (%)	35.5	35.4	39.1	39.5
Oxygen (%)	2.7	2.7	1.5	1.1
Balance (%)	4.5	16.2	6.2	4.6

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-5 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	100	102	98	99
Flow Rate (scfm)	-	37	-	62
Methane (%)	67.1	52.9	59	58.2
Carbon Dioxide (%)	32.4	39.3	42.2	40.9
Oxygen (%)	0.3	0.4	0	0.4
Balance (%)	0.2	7.4	0	0.5

LFG Well GW-6 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	100	100	72	55
Flow Rate (scfm)	-	7	-	-
Methane (%)	38.8	46.1	49.4	57.8
Carbon Dioxide (%)	27.5	34.7	35.1	34.6
Oxygen (%)	6.6	2	3.7	0.4
Balance (%)	27.1	17.2	11.8	7.2

LFG Well GW-7 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	130	120	134	132
Flow Rate (scfm)	-	-	-	24
Methane (%)	74.9	49.4	52.1	51.5
Carbon Dioxide (%)	24.4	37.9	41	38.7
Oxygen (%)	0	0.6	0	1.3
Balance (%)	0.7	12.1	6.9	8.5

LFG Well GW-8 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	125	123	127	126
Flow Rate (scfm)	-	36	-	50
Methane (%)	64.4	43.6	53.4	51.3
Carbon Dioxide (%)	25.1	36.7	41.7	40.3
Oxygen (%)	0	0	0	0.8
Balance (%)	10.5	19.7	4.9	7.6

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-9 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	116	121	117	119
Flow Rate (scfm)	-	-	56	36
Methane (%)	56.6	46.8	55.3	48.9
Carbon Dioxide (%)	36.6	37.9	40.4	36.6
Oxygen (%)	0	0	0	1.6
Balance (%)	6.8	15.3	4.3	12.9

LFG Well GW-10 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	94	94	92	91
Flow Rate (scfm)	-	9	-	54
Methane (%)	26.3	37.5	49.8	54.6
Carbon Dioxide (%)	19.8	31.6	40.5	39.9
Oxygen (%)	9.4	4.2	0	0
Balance (%)	44.5	26.7	9.7	5.5

LFG Well GW-11 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	110	108	109	111
Flow Rate (scfm)	-	-	-	54
Methane (%)	66.4	46.5	53.7	50.7
Carbon Dioxide (%)	33	36.6	42.1	39.5
Oxygen (%)	0	1.2	0	1.1
Balance (%)	0.6	15.7	4.2	8.7

LFG Well GW-12 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	128	122	124	127
Flow Rate (scfm)	-	32	-	21
Methane (%)	65.3	45.5	55.8	51.8
Carbon Dioxide (%)	33.1	35.1	2.9	36.9
Oxygen (%)	1.6	2.9	0	1.1
Balance (%)	0	16.5	1.9	10.2

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-13 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	126	120	123	120
Flow Rate (scfm)	-	7	-	25
Methane (%)	72.2	48.8	54.8	49.9
Carbon Dioxide (%)	27.4	38.3	43.1	45.2
Oxygen (%)	0	0.9	0	0
Balance (%)	0.4	12	2.1	4.9

LFG Well GW-14 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	130	96	-	79
Flow Rate (scfm)	-	11	-	-
Methane (%)	42.2	52.8	-	55
Carbon Dioxide (%)	29	38.1	-	44.6
Oxygen (%)	5.6	1	-	0
Balance (%)	23.2	8.1	-	0.4

LFG Well GW-15 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	92	90	87	76
Flow Rate (scfm)	-	8	-	14
Methane (%)	66.5	47.9	50.7	37.8
Carbon Dioxide (%)	33.5	38.3	41.2	31.4
Oxygen (%)	0	1.3	0.9	5.5
Balance (%)	0	12.5	7.2	25.3

LFG Well GW-16 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	120	116	118	117
Flow Rate (scfm)	-	-	-	59
Methane (%)	45.1	46.3	55	52.4
Carbon Dioxide (%)	28.6	38	43.5	39
Oxygen (%)	5.3	0.8	0	1.8
Balance (%)	21	14.9	1.5	6.8

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-17 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	128	126	133	133
Flow Rate (scfm)	-	12	-	10
Methane (%)	58.9	47	56.9	51.7
Carbon Dioxide (%)	36.5	36.2	42.6	38
Oxygen (%)	1.5	2.2	0	2
Balance (%)	3.1	14.6	0.5	8.3

LFG Well GW-18 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	140	140	138	-
Flow Rate (scfm)	-	7	-	-
Methane (%)	46	53.2	60.8	-
Carbon Dioxide (%)	28.8	37.4	39.3	-
Oxygen (%)	6.6	0.9	0	-
Balance (%)	18.6	8.5	0	-

LFG Well GW-19 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	112	112	-	101
Flow Rate (scfm)	-	-	-	
Methane (%)	65.1	59.6	-	58.9
Carbon Dioxide (%)	34.7	36.6	-	39.7
Oxygen (%)	0	0	-	0
Balance (%)	0.2	3.8	-	1.4

LFG Well GW-20 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	94	92	91	92
Flow Rate (scfm)	-	-	-	28
Methane (%)	54.9	51.9	51.9	55.9
Carbon Dioxide (%)	36.4	41.4	41.9	43.1
Oxygen (%)	2.5	0.4	0.3	0.3
Balance (%)	6.2	6.3	5.9	0.7

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-21 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	140	140	141	141
Flow Rate (scfm)	-	33	-	33
Methane (%)	66.3	52.4	56.5	51
Carbon Dioxide (%)	33.5	41	42.2	36.6
Oxygen (%)	0	0.1	0	2
Balance (%)	0.2	6.5	1.3	10.4

LFG Well GW-22 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	138	133	135	139
Flow Rate (scfm)	-	11	18	47
Methane (%)	69.4	44.9	58.7	53.5
Carbon Dioxide (%)	29.7	30.8	40.2	42.6
Oxygen (%)	0.9	3.7	0	0
Balance (%)	0	20.6	1.1	3.9

LFG Well GW-23 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	-	120	125	126
Flow Rate (scfm)	-	-	-	-
Methane (%)	-	53	59.3	55.5
Carbon Dioxide (%)	-	36.2	40.2	43.2
Oxygen (%)	-	1.3	0	0
Balance (%)	-	9.5	0.5	1.3

LFG Well GW-24 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	108	102	100	103
Flow Rate (scfm)	-	6	-	21
Methane (%)	35.1	32.3	52	52.9
Carbon Dioxide (%)	25.4	29.8	42.3	42
Oxygen (%)	7.3	6.3	0	0.1
Balance (%)	32.2	31.6	5.7	5

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-25 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	120	122	121	122
Flow Rate (scfm)	-	36	-	27
Methane (%)	19.1	34.2	55.3	51.3
Carbon Dioxide (%)	12.8	28.6	43.9	39.4
Oxygen (%)	13.1	5.7	0	1.6
Balance (%)	55	31.5	0.8	7.7

LFG Well GW-26 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	139	142	144	146
Flow Rate (scfm)	-	24	-	22
Methane (%)	69.5	51.4	56.9	51.3
Carbon Dioxide (%)	0.1	39.7	41.4	37.8
Oxygen (%)	0.3	0.3	0	1.8
Balance (%)	30.1	8.6	1.7	9.1

LFG Well GW-27 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	131	131	134	129
Flow Rate (scfm)	-	32	-	51
Methane (%)	47.4	42.9	59.9	54.3
Carbon Dioxide (%)	29.9	32.9	38.5	43.5
Oxygen (%)	5.7	4	0	0
Balance (%)	17	20.2	1.6	2.2

LFG Well GW-28 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	130	130	131	134
Flow Rate (scfm)	-	38	-	32
Methane (%)	69.2	52.8	57	49.1
Carbon Dioxide (%)	29.2	39.1	41.9	36
Oxygen (%)	0.2	0.4	0	2.4
Balance (%)	1.4	7.7	1.1	12.5

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-29 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	135	137	138	137
Flow Rate (scfm)	-	41	-	34
Methane (%)	65.7	53.2	60.1	57
Carbon Dioxide (%)	34.3	38.2	40.1	37.5
Oxygen (%)	0	0.5	0	1.4
Balance (%)	0	8.1	0	4.1

LFG Well GW-30 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	136	131	130	131
Flow Rate (scfm)	-	-	-	-
Methane (%)	79.4	51.8	57.3	53.4
Carbon Dioxide (%)	20.4	38.1	40.4	37.6
Oxygen (%)	0	0.9	0	1.3
Balance (%)	0.2	9.2	2.3	7.7

LFG Well GW-31 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	132	131	135	134
Flow Rate (scfm)	-	32	-	41
Methane (%)	66.8	49.9	54.9	51.8
Carbon Dioxide (%)	32.8	37.2	41.7	37.9
Oxygen (%)	0.2	1.5	0	1.2
Balance (%)	0.2	11.4	3.4	9.1

LFG Well GW-32 (Test Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	129	126	131	131
Flow Rate (scfm)	-	27	-	39
Methane (%)	70.9	50.5	57.3	55.8
Carbon Dioxide (%)	28	37.9	40.2	37.6
Oxygen (%)	0	0.8	0	1
Balance (%)	1.1	10.8	2.5	5.6

TABLE 4
LANDFILL GAS DATA
(continued)

LFG Well GW-33 (Control Area)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02
Temperature (degrees F)	-	120	126	130
Flow Rate (scfm)	-	43	-	51
Methane (%)	-	44.3	60.1	55.4
Carbon Dioxide (%)	-	30.8	39	37.1
Oxygen (%)	-	3.9	0	1.1
Balance (%)	-	21	0.9	6.4

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

Cell 1 (Control Area)

Parameter	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Biological Oxygen Demand	mg/l	103	30	74.7	346
Chemical Oxygen Demand	mg/l	732	508	778	981
Total Organic Carbon	mg/l	193	88	254	279
BOD/COD Ratio	-	0.14	0.06	0.10	0.35
COD/TOC Ratio	-	3.79	5.79	3.06	3.52
Chloride	mg/l	1380	915	1370	1130
Sulfate	mg/l	47.3	162	23.5	<5
Nitrate Nitrogen	mg/l as N	<0.05	<0.050	<0.05	<0.05
Ammonia Nitrogen	mg/l as N	0.82	509	1140	539
pH	-	7.23	7.02	7.3	7.2

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Arsenic	mg/l	0.037	0.031	0.034	0.036
Barium	mg/l	0.57	0.49	0.52	0.46
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001
Chromium	mg/l	0.023	0.017	0.046	0.034
Lead	mg/l	<0.005	<0.005	<0.005	<0.005
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004
Nitrite Nitrogen	mg/L	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen	mg/L	<0.10	293	226	413
Ortho Phosphorus	mg/L	0.59	0.54	0.36	0.48
Potassium	mg/l	383	235	362	308
Selenium	mg/l	<0.01	0.01	<0.01	0.014
Silver	mg/l	<0.05	<0.05	<0.05	<0.05
Total Dissolved Solids	mg/L	3880	2570	3910	3780
Total Phosphorus	mg/L	0.87	0.76	1.6	<0.4

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
(continued)

Cell 2 (Control Area)

Parameter		27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Biological Oxygen Demand	mg/l	357	462	378	396
Chemical Oxygen Demand	mg/l	1,960	2,050	1,700	1,290
Total Organic Carbon	mg/l	311	511	396	408
BOD/COD Ratio	-	0.18	0.23	0.22	0.31
COD/TOC Ratio	-	6.30	4.01	4.29	3.16
Chloride	mg/l	1970	1,630	1,680	1240
Sulfate	mg/l	<10	89	<5	<10
Nitrate Nitrogen	mg/l as N	0.19	0.13	<0.05	0.16
Ammonia Nitrogen	mg/l as N	1700	1120	1790	1390
pH	-	6.86	7.44	7.4	7.17

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Arsenic	mg/l	0.038	0.035	0.028	0.02
Barium	mg/l	0.11	0.1	0.22	0.14
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001
Chromium	mg/l	0.099	0.076	0.065	0.048
Lead	mg/l	<0.005	<0.005	<0.005	<0.005
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004
Nitrite Nitrogen	mg/L	0.19	0.15	0.17	<0.05
Total Kjeldahl Nitrogen	mg/L	<0.10	965	625	808
Ortho Phosphorus	mg/L	1	0.39	0.4	0.53
Potassium	mg/l	848	617	557	452
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01
Silver	mg/l	<0.05	<0.05	<0.05	<0.05
Total Dissolved Solids	mg/L	7230	6600	5900	5190
Total Phosphorus	mg/L	1.8	0.58	1	0.75

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
(continued)

Cell 3 (Test Area)

Parameter	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Biological Oxygen Demand	mg/l	157	226	65.7	1100
Chemical Oxygen Demand	mg/l	1,600	545	440	1,720
Total Organic Carbon	mg/l	527	132	137	506
BOD/COD Ratio	-	0.10	0.41	0.15	0.64
COD/TOC Ratio	-	3.04	4.13	3.21	3.40
Chloride	mg/l	1,690	84	660	318
Sulfate	mg/l	28	32	12.5	<10
Nitrate Nitrogen	mg/l as N	0.061	<0.05	<0.05	0.13
Ammonia Nitrogen	mg/l as N	3,120	15	866	730
pH	-	7.3	6.18	7.24	6.17

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Arsenic	mg/l	0.034	<0.02	<0.02	<0.02
Barium	mg/l	0.13	0.23	0.3	0.51
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001
Chromium	mg/l	0.13	0.006	0.019	0.032
Lead	mg/l	<0.005	<0.005	<0.005	0.0076
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004
Nitrite Nitrogen	mg/L	0.079	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen	mg/L	<0.10	30.3	129	316
Ortho Phosphorus	mg/L	3.3	0.27	0.36	<0.04
Potassium	mg/l	853	44.4	246	228
Selenium	mg/l	<0.01	<0.01	<0.01	0.012
Silver	mg/l	<0.05	<0.05	<0.05	<0.05
Total Dissolved Solids	mg/L	7010	625	2720	2500
Total Phosphorus	mg/L	5.6	0.29	<0.4	0.36

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
(continued)

Cell 4 (Control Area)

Parameter		27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Biological Oxygen Demand	mg/l	77	64	180	166
Chemical Oxygen Demand	mg/l	1,390	974	926	627
Total Organic Carbon	mg/l	430	271	290	197
BOD/COD Ratio	-	0.06	0.07	0.19	0.26
COD/TOC Ratio	-	3.23	3.59	3.19	3.18
Chloride	mg/l	1,640	964	721	592
Sulfate	mg/l	29.5	97.5	<5	<10
Nitrate Nitrogen	mg/l as N	0.05	0.061	<0.05	0.063
Ammonia Nitrogen	mg/l as N	1.4	312	912	725
pH	-	7.27	7.44	7.13	5.51

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Arsenic	mg/l	0.026	0.022	<0.02	<0.02
Barium	mg/l	0.17	0.16	0.21	0.18
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001
Chromium	mg/l	0.1	0.054	0.04	0.03
Lead	mg/l	<0.005	<0.005	<0.005	0.0053
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004
Nitrite Nitrogen	mg/L	0.063	<0.05	0.05	<0.05
Total Kjeldahl Nitrogen	mg/L	0.11	582	267	399
Ortho Phosphorus	mg/L	3.8	2.2	0.8	0.76
Potassium	mg/l	618	380	353	277
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01
Silver	mg/l	<0.05	<0.05	<0.05	<0.05
Total Dissolved Solids	mg/L	6820	3800	3660	3000
Total Phosphorus	mg/L	4.4	2.3	1.2	0.53

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
(continued)

Leachate Storage Tank

Parameter	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Biological Oxygen Demand	mg/l	408	360	987	114
Chemical Oxygen Demand	mg/l	1,160	719	1,740	1,420
Total Organic Carbon	mg/l	385	412	545	493
BOD/COD Ratio	-	0.35	0.50	0.57	0.08
COD/TOC Ratio	-	3.01	1.75	3.19	2.88
Chloride	mg/l	579	555	432	420
Sulfate	mg/l	<5	<5	<5	<5
Nitrate Nitrogen	mg/l as N	<0.05	0.061	0.075	<0.01
Ammonia Nitrogen	mg/l as N	0.48	298	781	436
pH	-	6.98	7.2	7.11	7.11

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02
Arsenic	mg/l	0.026	0.02	<0.02	<0.02
Barium	mg/l	0.31	0.28	0.27	0.32
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001
Chromium	mg/l	0.021	0.023	0.022	0.02
Lead	mg/l	<0.005	<0.005	<0.005	0.0066
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004
Nitrite Nitrogen	mg/L	0.085	0.11	0.1	0.24
Total Kjeldahl Nitrogen	mg/L	3.1	3960	201	278
Ortho Phosphorus	mg/L	<0.02	<0.02	<0.02	<0.02
Potassium	mg/l	184	203	175	131
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01
Silver	mg/l	<0.05	<0.05	<0.05	<0.05
Total Dissolved Solids	mg/L	2520	2270	2480	2160
Total Phosphorus	mg/L	0.26	0.37	<1	0.23

TABLE 6
SUMMARY OF LEACHATE QUANTITY DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

				2002												
				Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Annual Total**
Control Area	Pump House #1	Primary	gallons	60,500	16,300	72,500	84,500	30,000	16,400	17,000	25,100	16,200	64,300	87,600		490,400
		Secondary	gallons	0	0	0	200	0	0	0	200	0	0	0		400
	Pump House #2	Primary	gallons	38,000	18,800	37,900	33,400	21,900	17,700	18,900	28,300	27,200	60,500	72,000		374,600
		Secondary	gallons													0
Test Area	Pump House #3	Primary	gallons	13,500	7,600	22,700	33,800	17,100	10,200	10,500	14,000	12,400	38,700	66,900		247,400
		Secondary	gallons													0
Control Area	Pump House #4	Primary	gallons	40,400	19,100	60,600	66,700	23,400	30,600	17,100	31,100	20,500	68,200	152,700		530,400
		Secondary	gallons	0	0	0	0	0	0	0	0	0	0	300		300
	Monthly Total		gallons	152,400	61,800	193,700	218,600	92,400	74,900	63,500	98,700	76,300	231,700	379,500	0	1,643,500

Note:

This table is based on site records for the King George County Landfill and Recycling Center showing the amount of leachate collected in the primary and secondary leachate collection system.
These records were provided by the site manager (Howard Burns).
The test area is represented by Pump House #3 and the control area is represented by Pump Houses #1, 2, and 4.

TABLE 7
LIQUID APPLICATION SUMMARY
Project XL
King George County Landfill and Recycling Center
King George, Virginia

	Liquid Applied (gallons)						Monthly Summary					
Date	Trench 1	Trench 2	Trench 3	Trench 4	Trench 5	Cumulative Total	Trench 1	Trench 2	Trench 3	Trench 4	Trench 5	Monthly Total
11/1/2002	27,971	0	5,990	0	0	33,962						
11/2/2002	29,017	7,357	0	0	0	70,336						
11/3/2002	0	0	0	0	0	70,336						
11/4/2002	40,175	0	0	0	0	110,511						
11/5/2002	20,871	0	0	0	0	131,381						
11/6/2002	0	0	0	0	0	131,381						
11/7/2002	0	0	0	0	0	131,381						
11/8/2002	39,108	0	0	0	0	170,489						
11/9/2002	0	0	35,540	0	0	206,029						
11/10/2002	0	0	0	0	0	206,029						
11/11/2002	30,676	5,835	0	0	0	242,540						
11/12/2002	0	0	34,137	0	0	276,676						
11/13/2002	0	0	31,974	0	0	308,650						
11/14/2002	0	0	0	0	0	308,650						
11/15/2002	7,561	0	20,904	0	0	337,115						
11/16/2002	0	0	0	0	0	337,115						
11/17/2002	0	0	0	0	0	337,115						
11/18/2002	5,122	0	0	0	0	342,237						
11/19/2002	4,983	0	0	0	0	347,221						
11/20/2002	0	0	0	0	0	347,221						
11/21/2002	0	0	0	0	0	347,221						
11/22/2002	0	0	0	0	0	347,221						
11/23/2002	0	0	0	0	0	347,221						
11/24/2002	0	0	0	0	0	347,221						
11/25/2002	0	0	0	0	0	347,221						
11/26/2002	0	0	0	35,743	0	382,964						
11/27/2002	0	0	0	36,506	0	419,470						
11/28/2002	0	0	0	0	0	419,470						
11/29/2002	0	0	0	38,811	0	458,281						
11/30/2002	0	0	0	23,542	0	481,823	205,484	13,192	128,544	134,602	0	481,823
12/1/2002	0	0	0	0	0	481,823						
12/2/2002	0	0	0	32,799	0	514,621						
12/3/2002	26,297	0	0	12,542	0	553,460						
12/4/2002	19,878	0	13,444	0	0	586,782						
12/5/2002	0	0	0	0	0	586,782						
12/6/2002	0	0	0	0	0	586,782						
12/7/2002	0	0	0	0	0	586,782						
12/8/2002	0	0	0	0	0	586,782						
12/9/2002	5,592	0	0	22,930	0	615,305						
12/10/2002	0	0	0	31,796	0	647,101						
12/11/2002	0	0	0	0	0	647,101						
12/12/2002	0	0	0	24,137	0	671,237						

TABLE 7
LIQUID APPLICATION SUMMARY
Project XL
King George County Landfill and Recycling Center
King George, Virginia

	Liquid Applied (gallons)						Monthly Summary					
Date	Trench 1	Trench 2	Trench 3	Trench 4	Trench 5	Cumulative Total	Trench 1	Trench 2	Trench 3	Trench 4	Trench 5	Monthly Total
12/13/2002	0	0	0	0	39,458	710,695						
12/14/2002	0	0	0	0	23,177	733,873						
12/15/2002	0	0	0	0	0	733,873						
12/16/2002	0	0	0	0	31,103	764,976						
12/17/2002	0	0	0	0	37,427	802,403						
12/18/2002	0	0	0	0	39,616	842,019						
12/19/2002	0	0	0	29,137	38,631	909,787						
12/20/2002	0	0	0	0	18,261	928,048						
12/21/2002	0	0	0	13,062	48,861	989,971						
12/22/2002	0	0	0	0	0	989,971						
12/23/2002	6,012	0	0	11,801	56,755	1,064,540						
12/24/2002	0	0	0	0	18,540	1,083,079						
12/25/2002	0	0	0	0	0	1,083,079						
12/26/2002	0	0	0	0	36,631	1,119,710						
12/27/2002	0	0	0	0	12,343	1,132,053						
12/28/2002	0	0	0	0	0	1,132,053						
12/29/2002	0	0	0	0	0	1,132,053						
12/30/2002	0	0	0	0	0	1,132,053						
12/31/2002	0	0	0	0	0	1,132,053	57,779	0	13,444	178,204	400,803	650,230

Total per tre	235,293	13,192	135,998	312,806	400,803	Total Leachate Recirculated	1,132,053
Daily Avera	3,857	216	2,229	5,128	6,571	Total Daily Average	18,558

All units are in gallons

TABLE 8
SUMMARY OF LANDFILL SETTLEMENT DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

Point No.	Northing	Easting	Elev 11/11/2002
Control Area			
2004	6,785,273.540	11,825,080.835	214.14
2005	6,785,281.902	11,825,180.470	210.19
2006	6,785,286.082	11,825,230.287	209.06
2007	6,785,386.598	11,825,231.963	211.26
2008	6,785,373.252	11,825,072.613	213.42
2017	6,785,464.512	11,824,964.606	214.25
2018	6,785,472.923	11,825,064.335	214.09
2019	6,785,481.240	11,825,163.909	212.24
2020	6,785,487.529	11,825,238.699	214.79
2021	6,785,587.234	11,825,230.410	216.24
2022	6,785,580.952	11,825,155.668	215.52
2033	6,785,663.938	11,824,948.007	217.23
2034	6,785,672.348	11,825,047.680	216.58
2035	6,785,680.711	11,825,147.352	214.45
2036	6,785,689.045	11,825,246.985	217.93
2037	6,785,788.719	11,825,238.636	217.97
2038	6,785,790.026	11,825,253.647	218.52
2039	6,785,780.391	11,825,139.023	219.68
2050	6,785,863.427	11,824,931.430	221.82
2051	6,785,871.714	11,825,031.054	221.73
2052	6,785,880.114	11,825,130.756	220.44
2053	6,785,888.458	11,825,230.378	219.50
2054	6,785,891.411	11,825,265.294	218.52
2055	6,785,991.104	11,825,256.952	218.11
2056	6,785,992.789	11,825,276.900	224.73
2057	6,785,979.834	11,825,122.448	224.14
2068	6,786,062.852	11,824,914.813	N/A
2069	6,786,071.068	11,825,014.403	224.15
2070	6,786,079.485	11,825,114.077	221.38
2071	6,786,087.793	11,825,213.694	219.70
2072	6,786,094.066	11,825,288.420	223.36
2073	6,786,193.636	11,825,280.010	222.96
2074	6,786,195.259	11,825,299.912	224.44
2075	6,786,294.827	11,825,291.503	224.07
2076	6,786,295.215	11,825,296.486	222.78
2077	6,786,298.125	11,825,331.369	225.17
Test Area			
2000	6,785,240.088	11,824,682.224	213.49
2001	6,785,248.456	11,824,781.930	212.98
2002	6,785,256.812	11,824,881.506	214.76
2003	6,785,265.180	11,824,981.217	211.83
2009	6,785,364.886	11,824,972.951	212.76

TABLE 8 (continued)
SUMMARY OF LANDFILL SETTLEMENT DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

Point No.	Northing	Easting	Elev 11/11/2002
2010	6,785,356.487	11,824,873.240	215.54
2011	6,785,348.144	11,824,773.755	215.04
2012	6,785,348.134	11,824,773.630	216.14
2013	6,785,339.845	11,824,674.019	217.27
2014	6,785,439.424	11,824,665.653	216.17
2015	6,785,447.827	11,824,765.325	213.64
2016	6,785,456.211	11,824,865.005	213.01
2023	6,785,572.591	11,825,056.004	213.57
2024	6,785,564.236	11,824,956.388	215.79
2025	6,785,555.898	11,824,856.730	217.20
2026	6,785,547.534	11,824,757.074	218.14
2027	6,785,539.183	11,824,657.418	218.13
2028	6,785,537.109	11,824,632.498	219.30
2029	6,785,636.758	11,824,624.140	219.91
2030	6,785,638.817	11,824,649.053	219.66
2031	6,785,647.264	11,824,748.715	218.54
2032	6,785,655.574	11,824,848.362	216.32
2040	6,785,772.064	11,825,039.413	219.10
2041	6,785,763.606	11,824,939.696	219.18
2042	6,785,755.305	11,824,840.099	221.45
2043	6,785,746.963	11,824,740.458	220.63
2044	6,785,738.644	11,824,640.796	219.94
2045	6,785,734.462	11,824,590.978	221.48
2046	6,785,834.070	11,824,582.620	221.53
2047	6,785,838.299	11,824,632.437	222.60
2048	6,785,846.689	11,824,732.115	220.37
2049	6,785,854.908	11,824,831.718	221.17
2058	6,785,971.553	11,825,022.844	223.06
2059	6,785,963.148	11,824,923.161	223.00
2060	6,785,954.797	11,824,823.503	224.64
2061	6,785,946.396	11,824,723.855	224.92
2062	6,785,938.014	11,824,624.196	224.32
2063	6,785,931.278	11,824,544.488	231.42
2064	6,786,030.993	11,824,536.111	226.52
2065	6,786,037.774	11,824,615.832	225.65
2066	6,786,046.102	11,824,715.479	224.16
2067	6,786,054.381	11,824,815.140	225.35

TABLE 9
SUMMARY OF WASTE CHARACTERIZATION DATA
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

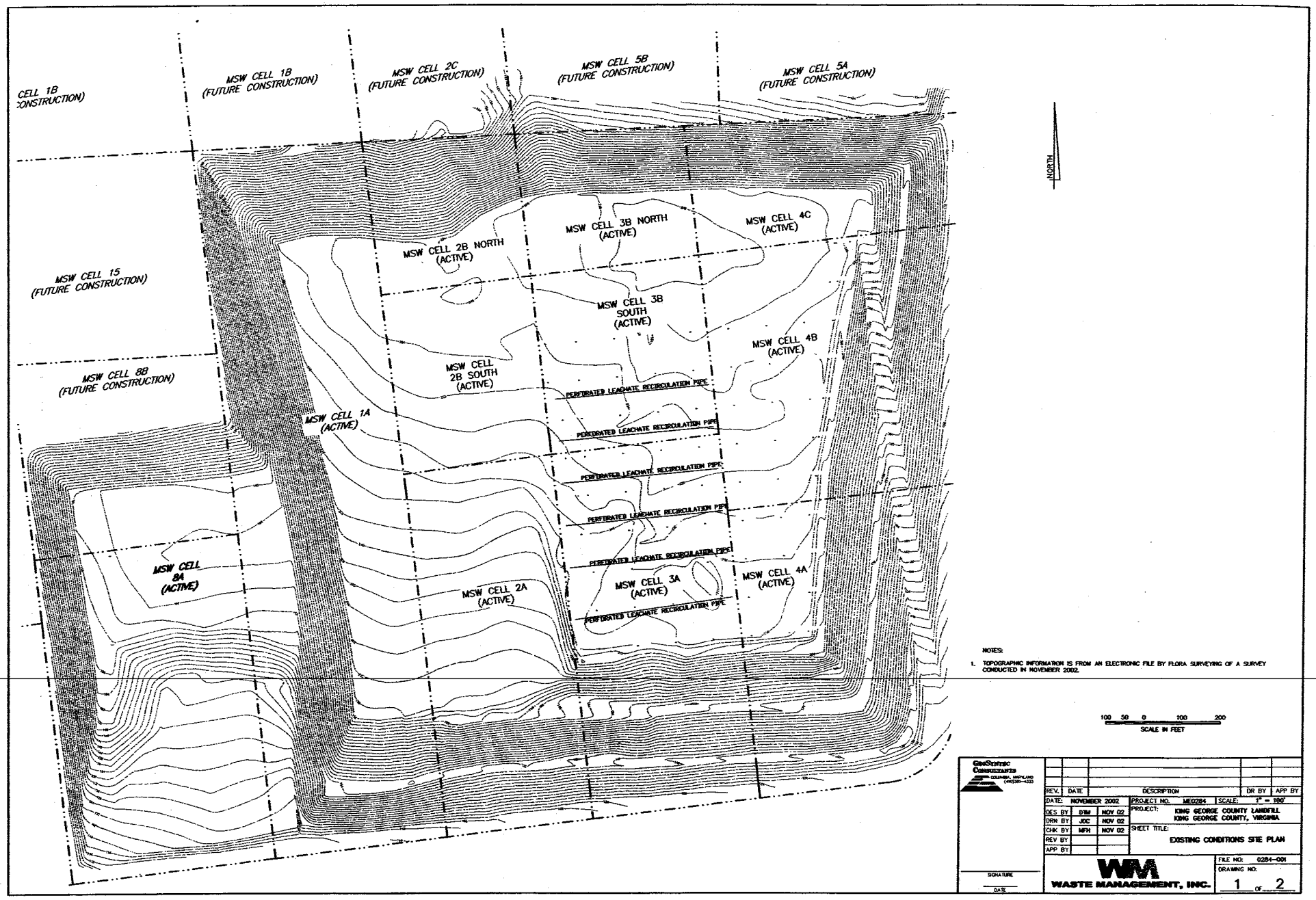
	Sample Date	Location	Depth (ft)	Moisture (%)	VS (%)	Cellulose (%)	Lignin (%)	Cell/Lig Ratio	pH (Field)	BMP (mL/g)
Control Area	8/2/2001	Control 1	0-15	46.79	54.93	34.07	16.98	2.01	6.5	65.98
					55.95	34.58	15.50	2.23		55.33
					54.61					61.81
	8/2/2001	Control 1	15-30	38.83	36.15	35.77	17.40	2.06	7.1	61.36
					51.33	39.24	14.40	2.73		65.39
					47.20					56.84
	8/2/2001	Control 1	30-45	24.00	47.33	28.92	14.60	1.98	6.5	47.28
					43.58	34.10	16.10	2.12		60.02
					43.46					45.69
	8/2/2001	Control 1	45-55	31.63	50.48	31.33	20.60	1.52	5.9	56.82
					38.85	31.36	20.20	1.55		53.45
					39.56					49.90
	8/2/2001	Control 1	55-70	26.19	49.18	37.83	15.50	2.44	5.4	60.60
					56.22	33.82	16.30	2.07		49.01
					51.10					63.11
	8/2/2001	Control 2	0-15	26.87	51.70	28.13	16.60	1.69	6.8	66.89
					54.71	30.31	18.40	1.65		63.09
					54.23					70.96
	8/2/2001	Control 2	15-30	37.94	70.30	37.24	14.50	2.57	6.8	54.11
					72.41	33.80	14.95	2.26		67.40
					72.29					52.77
	8/3/2001	Control 2	30-45	34.14	66.71	40.00	17.50	2.29	5.6	41.72
					67.42	41.51	17.90	2.32		50.13
					65.93					59.66
	8/3/2001	Control 2	45-60	25.74	43.16	31.34	16.03	1.96	5.7	44.21
					36.85	30.31	14.27	2.12		44.92
					42.51					52.92
	8/3/2001	Control 2	60-70	30.99	63.42	38.31	19.20	2.00	5.8	60.29
					68.24	38.87	20.20	1.92		62.82
					64.19					58.47
Test Area	8/1/2001	Bio 1	0-15	43.24	37.92	41.54	15.10	2.75	6.2	54.23
					42.52	29.56	14.80	2.00		52.86
					40.81					55.11
	8/1/2001	Bio 1	15-30	33.22	59.11	30.16	15.90	1.90	6.3	59.65
					56.11	31.50	19.60	1.61		59.43
					55.61					59.11
	8/1/2001	Bio 1	30-45	29.98	84.09	46.36	22.80	2.03	6.7	58.09
					86.16	44.05	21.60	2.04		59.01
					85.87					63.08
	8/1/2001	Bio 1	45-60	29.57	71.82	42.96	19.80	2.17	6.7	68.43
					70.59	41.52	20.00	2.08		69.13
					69.91					68.51
	8/1/2001	Bio 1	60-75	28.40	76.52	43.71	16.50	2.65	6.5	65.75
					73.66	47.18	16.00	2.95		64.50
					75.50					65.72
	7/31/2001	Bio 2	0-15	47.55	66.33	38.17	22.80	1.67	6.3	56.99
					67.31	35.99	23.25	1.55		59.11
					68.67					61.44

TABLE 9 (continued)
SUMMARY OF WASTE CHARACTERIZATION DATA
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

	Sample Date	Location	Depth (ft)	Moisture (%)	VS (%)	Cellulose (%)	Lignin (%)	Cell/Lig Ratio	pH (Field)	BMP (mL/g)
Test Area	7/31/2001	Bio 2	15-30	46.26	65.61	31.50	23.28	1.35	5.8	55.19
					63.50	34.17	21.10	1.62		55.45
					65.55					54.29
	7/31/2001	Bio 2	30-45	39.97	53.11	31.42	19.94	1.58	6.6	51.14
					57.05	39.49	22.94	1.72		49.98
					54.32					53.29
	7/31/2001	Bio 2	45-60	45.44	71.56	39.00	23.06	1.69	5.6	67.27
					72.01	32.99	23.91	1.38		67.47
					70.82					66.77
	7/31/2001	Bio 2	60-75	40.19	69.23	37.46	25.85	1.45	5.4	61.65
					71.53	41.60	25.56	1.63		60.32
					71.75					60.20
	7/31/2001	Bio 3	0-15	30.70	71.60	44.34	15.50	2.86	5.4	65.01
					72.68	52.14	15.00	3.48		58.48
					71.80					62.03
	7/31/2001	Bio 3	15-30	35.71	61.58	34.48	14.70	2.35	5.8	53.58
					57.21	35.86	14.10	2.54		53.53
					58.64					54.16
	8/1/2001	Bio 3	30-45	39.86	55.12	26.07	23.54	1.11	8.3	54.72
					51.37	26.51	29.46	0.90		55.69
					52.84					51.44
	8/1/2001	Bio 3	45-60	43.87	69.44	37.02	19.63	1.89	7.6	62.05
					72.26	33.94	21.22	1.60		62.58
					65.85					63.07
	8/1/2001	Bio 3	60-75	35.18	49.21	16.72	19.71	0.85	5.8	54.91
					44.06	21.16	21.33	0.99		57.04
					43.13					57.49

TABLE 10
2003 MONITORING ACTIVITIES
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

	Monitoring Parameters	Responsible Party	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. LEACHATE	Chemical parameters measured on site	WM personnel	X	X	X	X			X			X		
	Physical parameters measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Chemical parameters sampled on site from test area	Sampled by subcontractor, tested offsite by Geochemical	X	X	X	X			X			X		
	Chemical parameters sampled on site from storage tanks	Sampled by subcontractor, tested offsite by Geochemical	X	X	X	X			X			X		
2. LANDFILL GAS	Landfill gas composition measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Physical parameters measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Chemical parameters	WM personnel, testing by subcontractor	X	X	X	X			X			X		
	Surface landfill gas measured on site	Subcontractor	X	X	X	X			X			X		
3. SOLID WASTE	Survey, on site	Subcontractor		X		X		X		X		X		X
	Solid waste stabilization and decomposition measured on site	WM personnel										X		



NOTES:

1. TOPOGRAPHIC INFORMATION IS FROM AN ELECTRONIC FILE BY FLORA SURVEYING OF A SURVEY CONDUCTED IN NOVEMBER 2002.

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GeoSyntec Consultants
9200 Rt. 108, Columbia, Maryland 21045-1511
(410) 381-4333

REV.	DATE	DESCRIPTION	DR BY	APP BY

DATE: NOVEMBER 2002			PROJECT NO. ME0284	SCALE: 1" = 100'
DES BY	DTM	NOV 02	PROJECT: KING GEORGE COUNTY LANDFILL KING GEORGE COUNTY, VIRGINIA	
DRN BY	JDC	NOV 02		
CHK BY	MFH	NOV 02	SHEET TITLE: EXISTING CONDITIONS SITE PLAN	
REV BY				
APP BY				

SIGNATURE

DATE

WASTE MANAGEMENT, INC.

FILE NO: 0284-001

DRAWING NO: 1 OF 2

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FIGURE 2
LIQUID APPLIED TO LANDFILL - CUMULATIVE
Project XL
King George County Landfill and Recycling Center
King George, Virginia

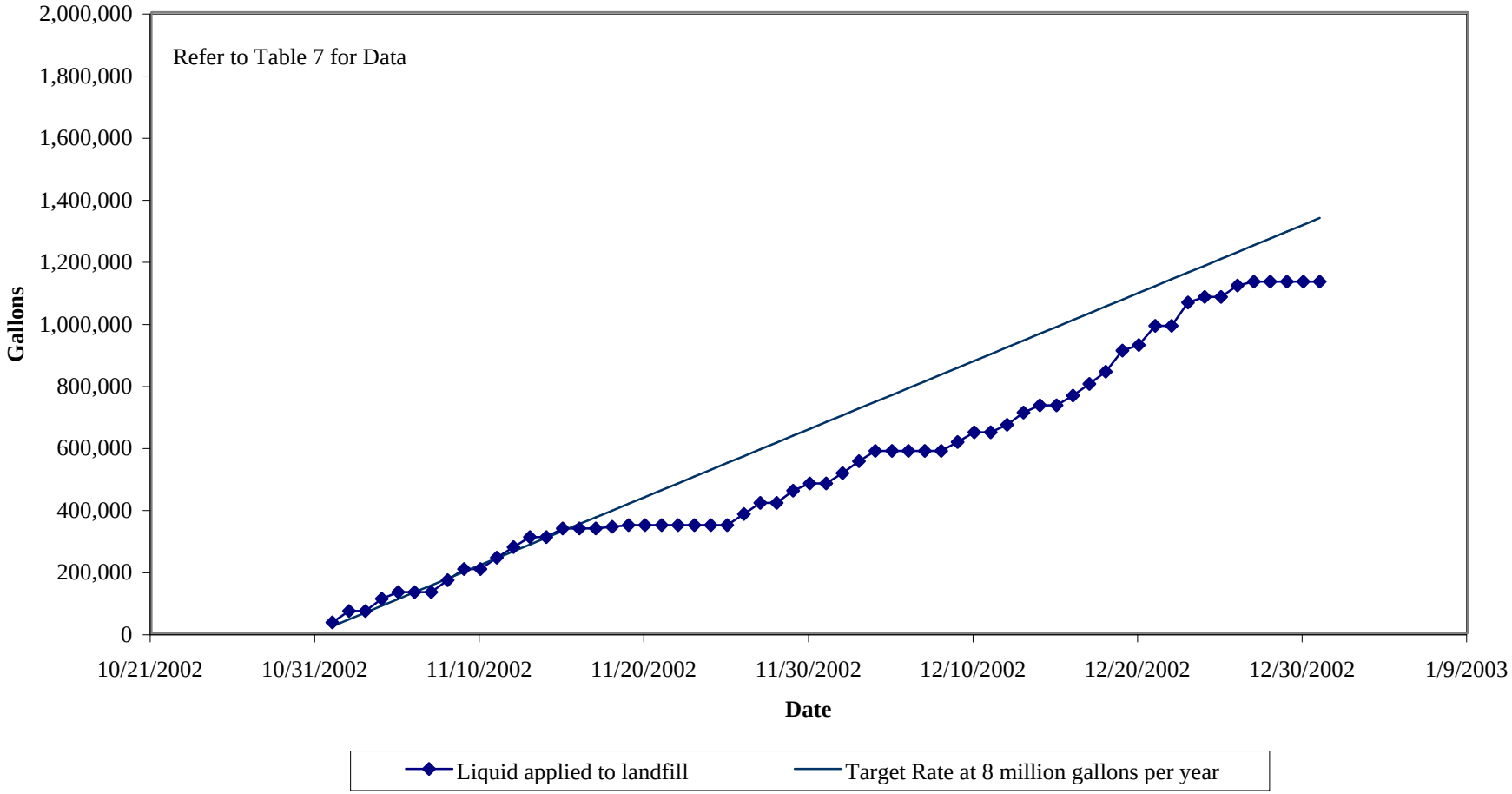


FIGURE 3
BOD/COD RATIO
Project XL
King George County Landfill and Recycling Center
King George, Virginia

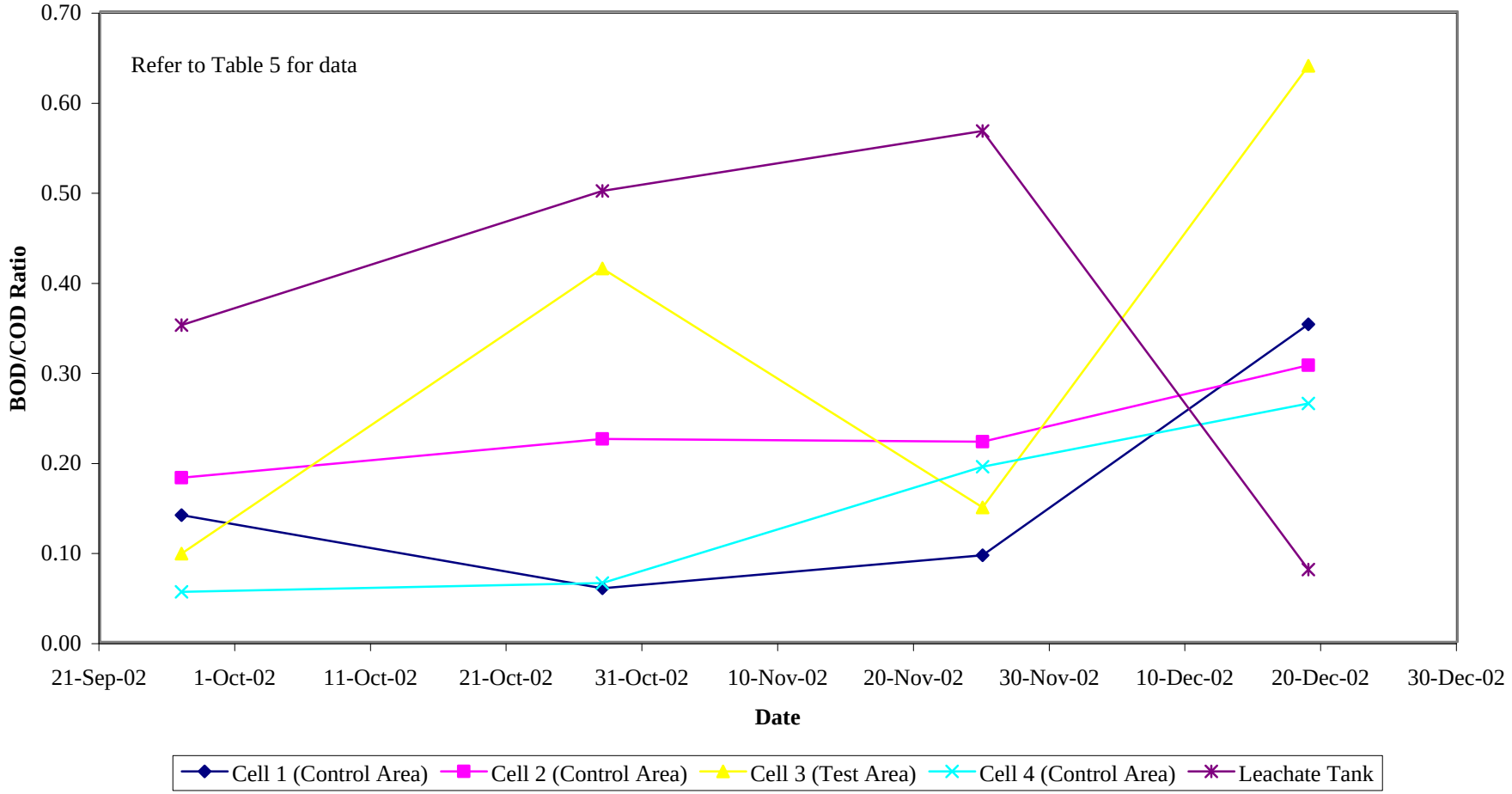


FIGURE 4
COD/TOC RATIO
Project XL
King George County Landfill and Recycling Center
King George, Virginia

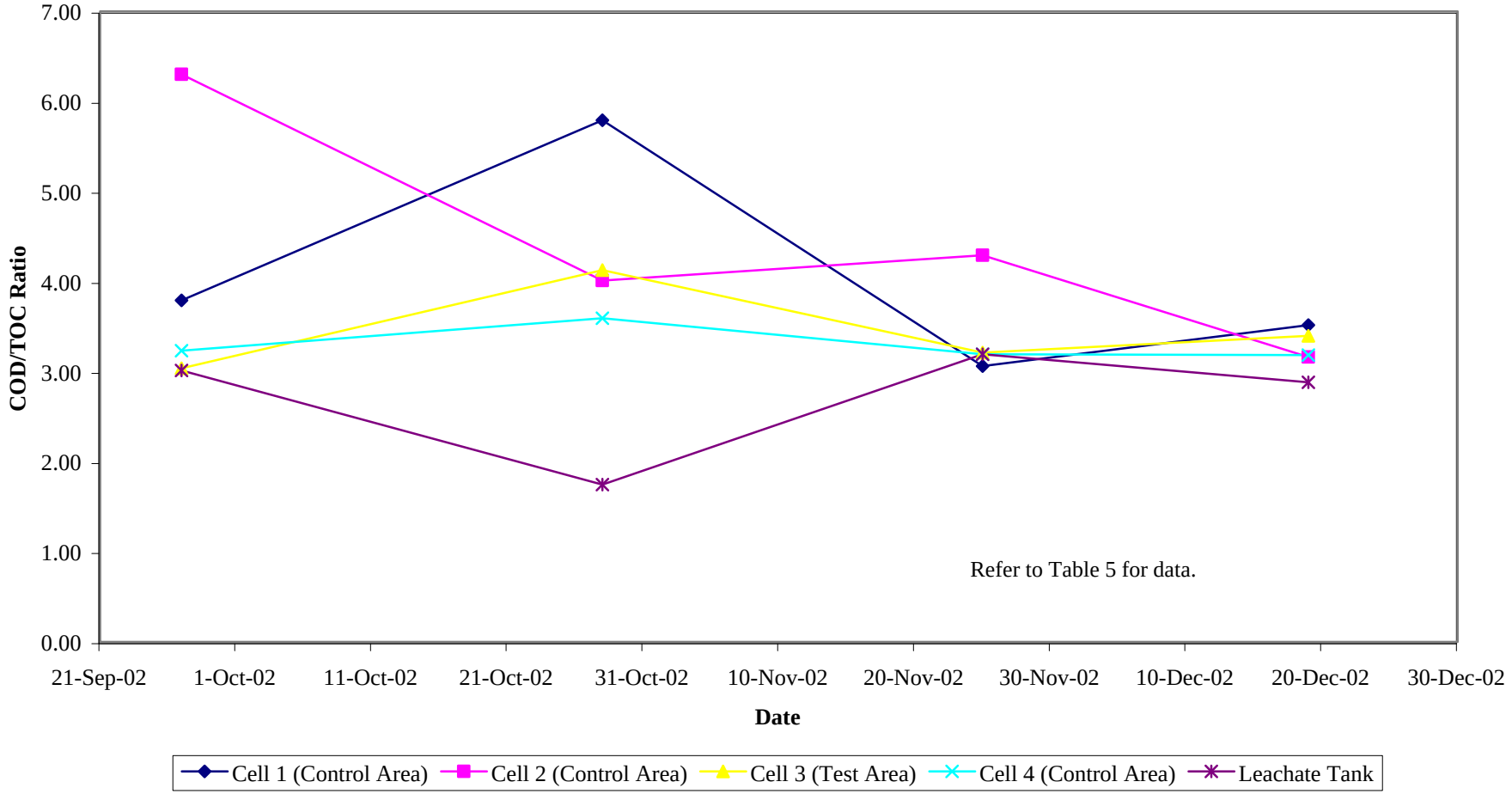


FIGURE 5
CHLORIDE CONCENTRATION
Project XL
King George County Landfill and Recycling Center
King George, Virginia

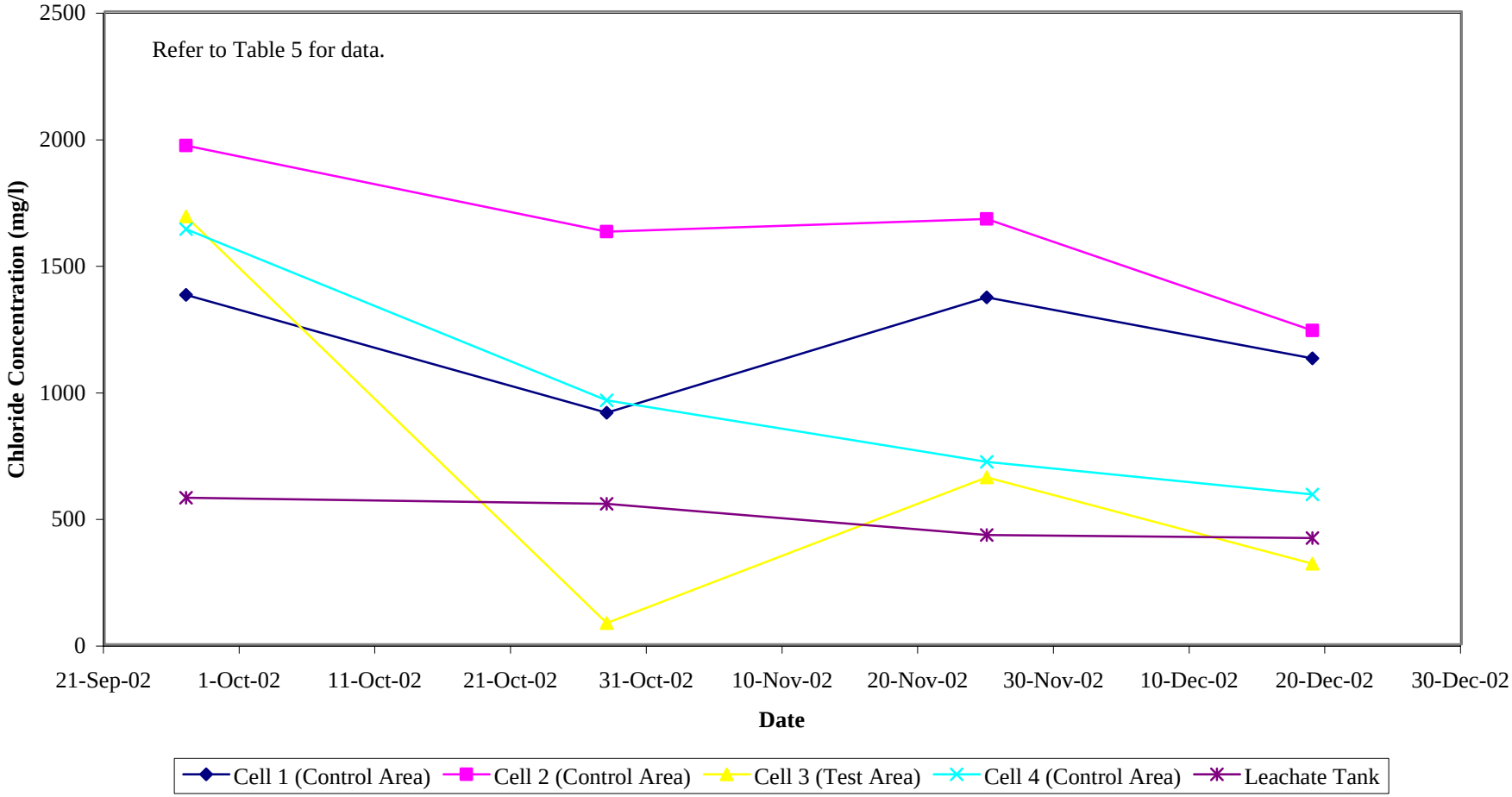


FIGURE 6
NITRATE NITROGEN CONCENTRATION
Project XL
King George County Landfill and Recycling Center
King George, Virginia

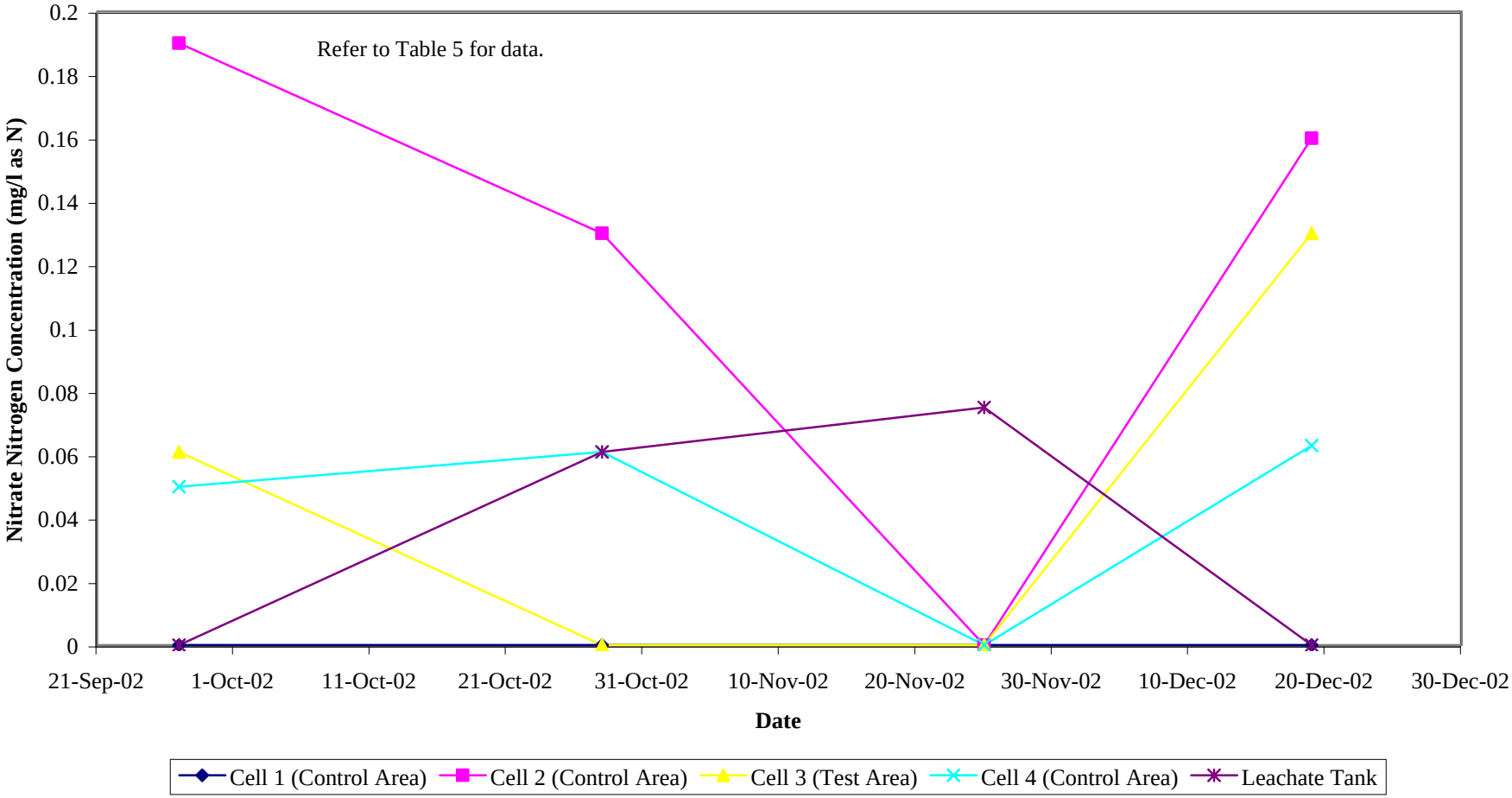


FIGURE 7
AMMONIA NITROGEN CONCENTRATION
Project XL
King George County Landfill and Recycling Center
King George, Virginia

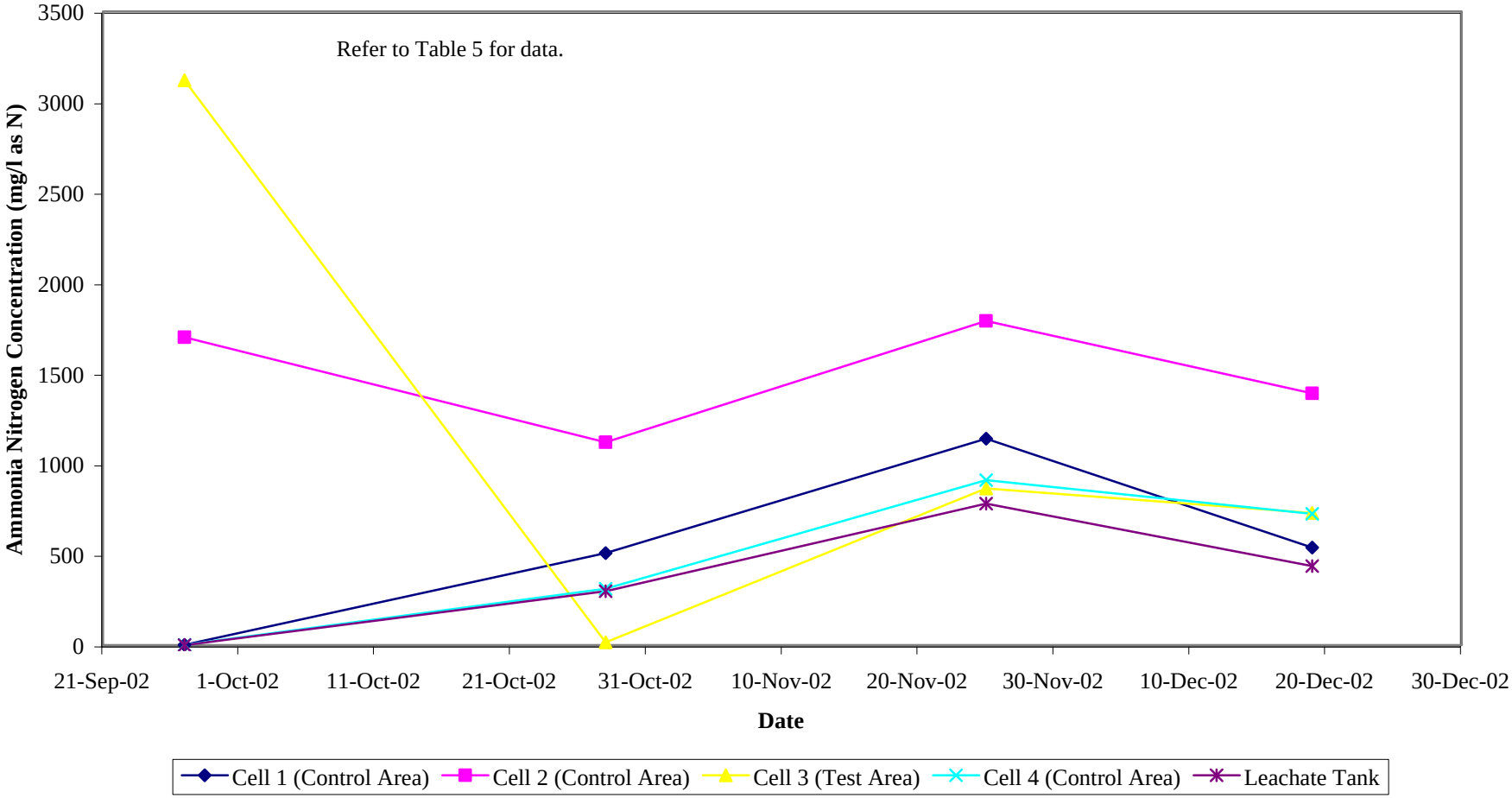


FIGURE 8
Variation in pH
Project XL
King George County Landfill and Recycling Center
King George, Virginia

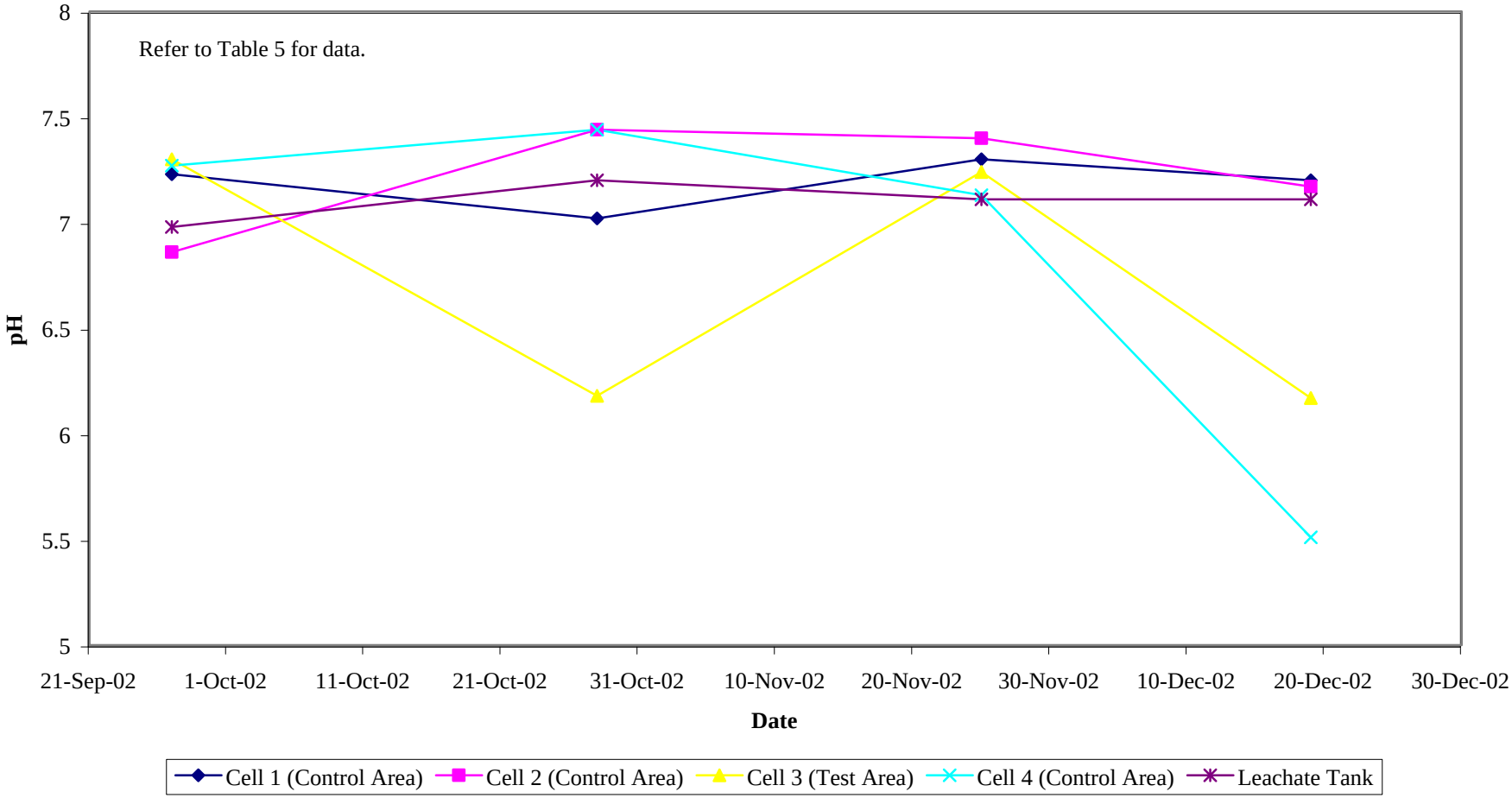


FIGURE 9
LANDFILL GAS QUANTITY DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

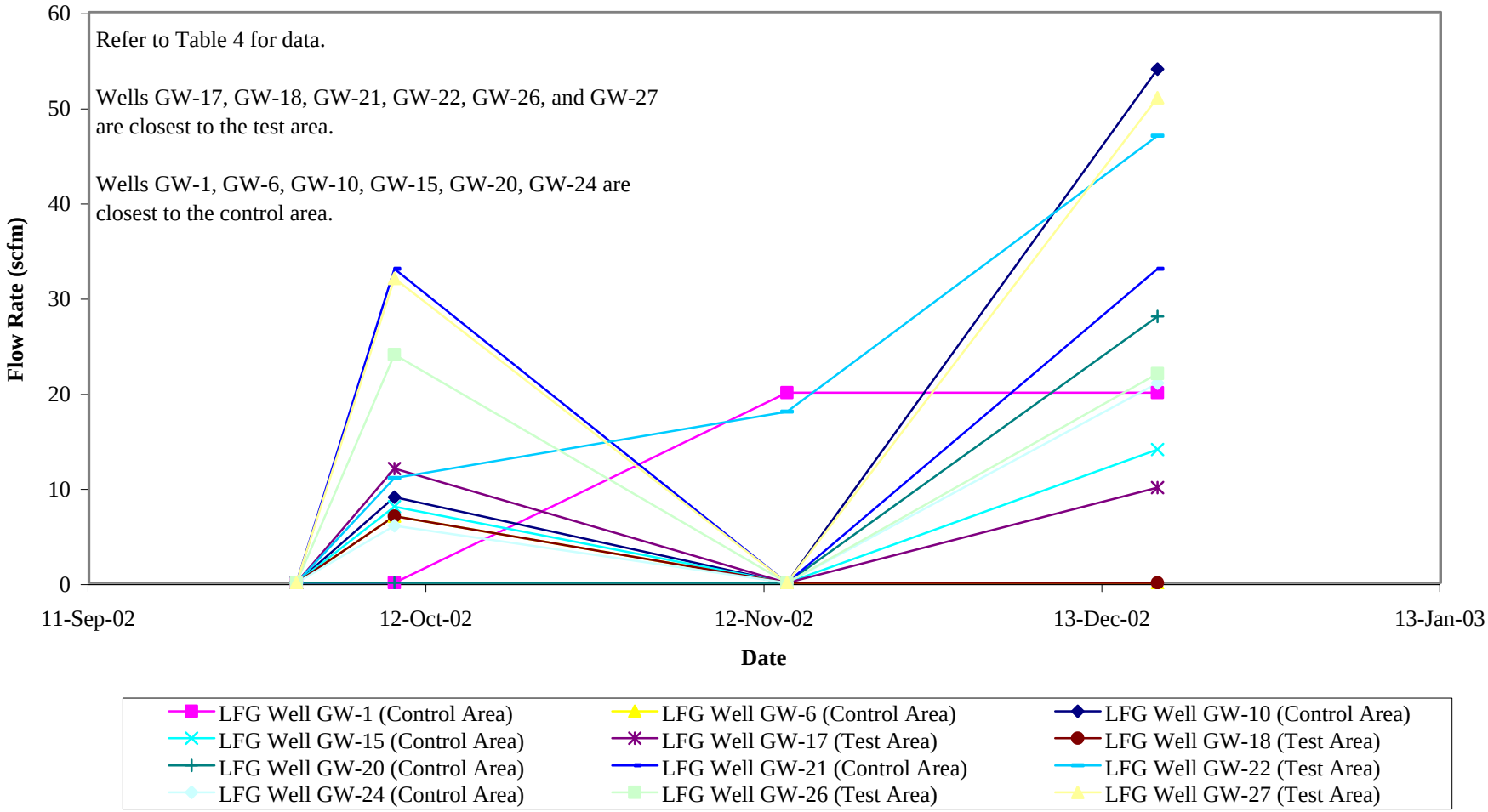


FIGURE 10
LANDFILL GAS QUALITY DATA - METHANE
Project XL
King George County Landfill and Recycling Center
King George, Virginia

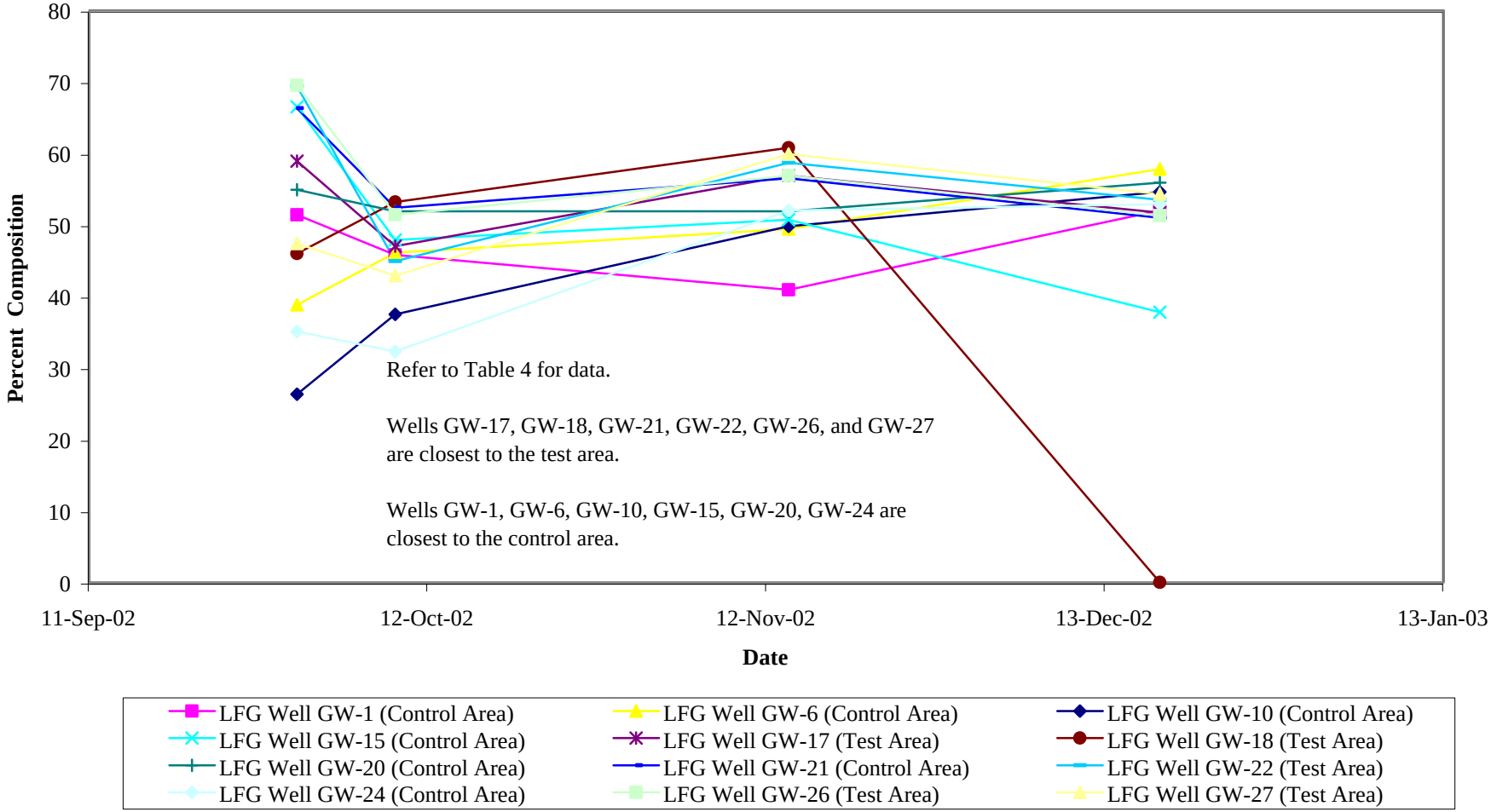
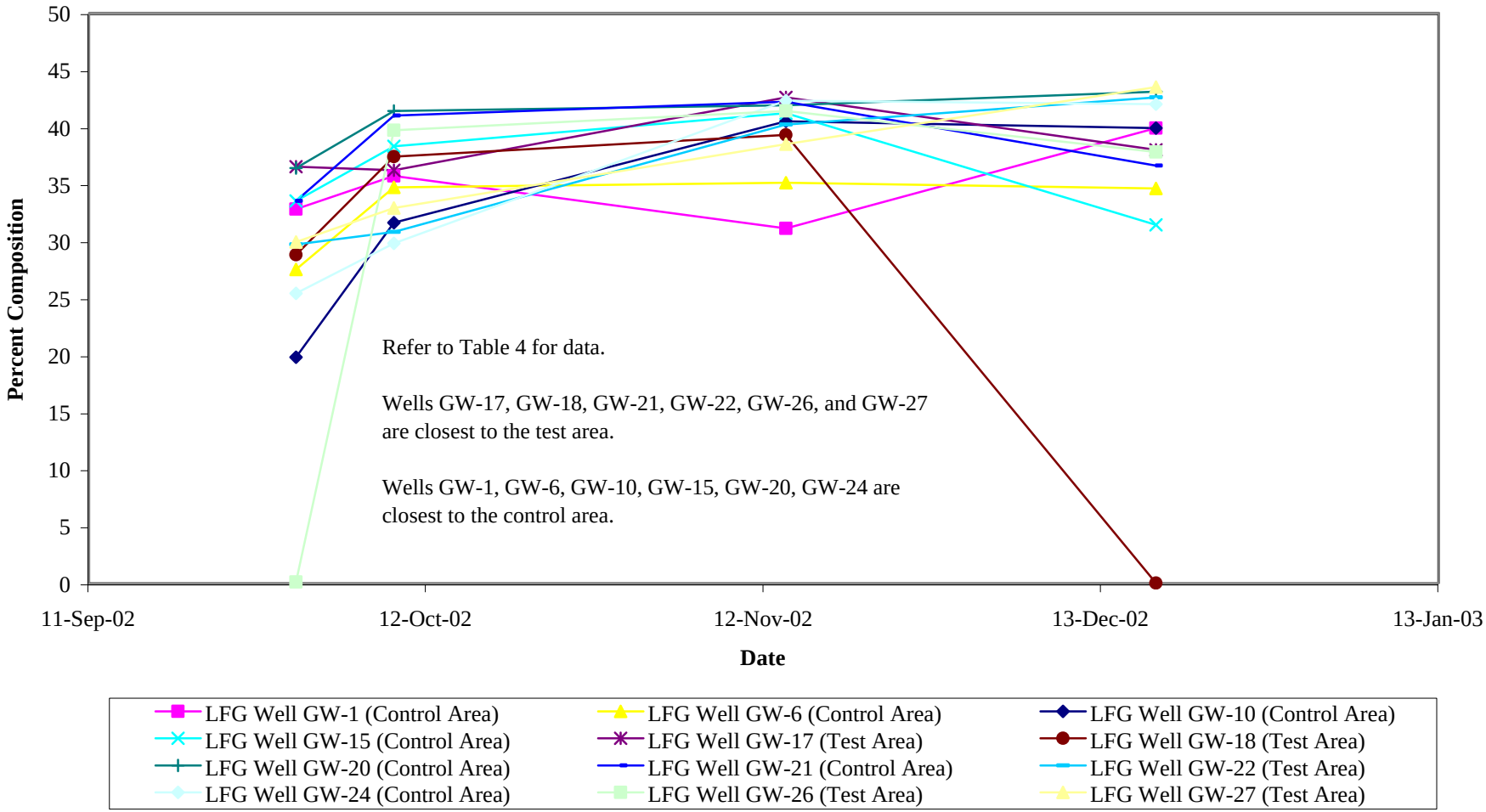
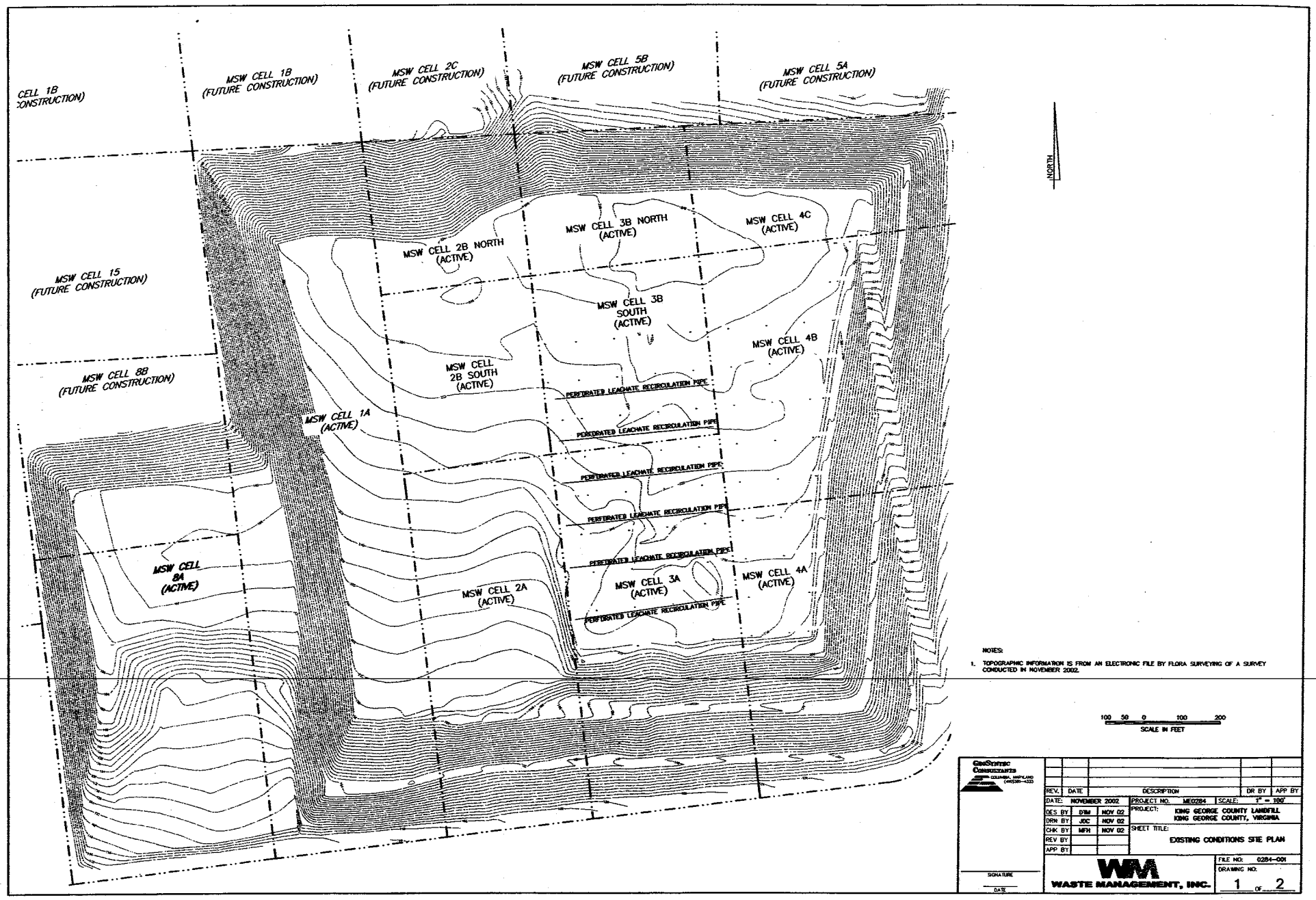


FIGURE 11
LANDFILL GAS QUALITY DATA - CARBON DIOXIDE
Project XL
King George County Landfill and Recycling Center
King George, Virginia





NOTES:

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(410) 381-4333

REV.	DATE	DESCRIPTION	DR BY	APP BY

DATE: NOVEMBER 2002			PROJECT NO. ME0284	SCALE: 1" = 100'
DES BY	DTM	NOV 02	PROJECT: KING GEORGE COUNTY LANDFILL KING GEORGE COUNTY, VIRGINIA	
DRN BY	JDC	NOV 02		
CHK BY	MFH	NOV 02	SHEET TITLE: EXISTING CONDITIONS SITE PLAN	
REV BY				
APP BY				

SIGNATURE

DATE

WASTE MANAGEMENT, INC.

FILE NO: 0284-001

DRAWING NO: 1 OF 2

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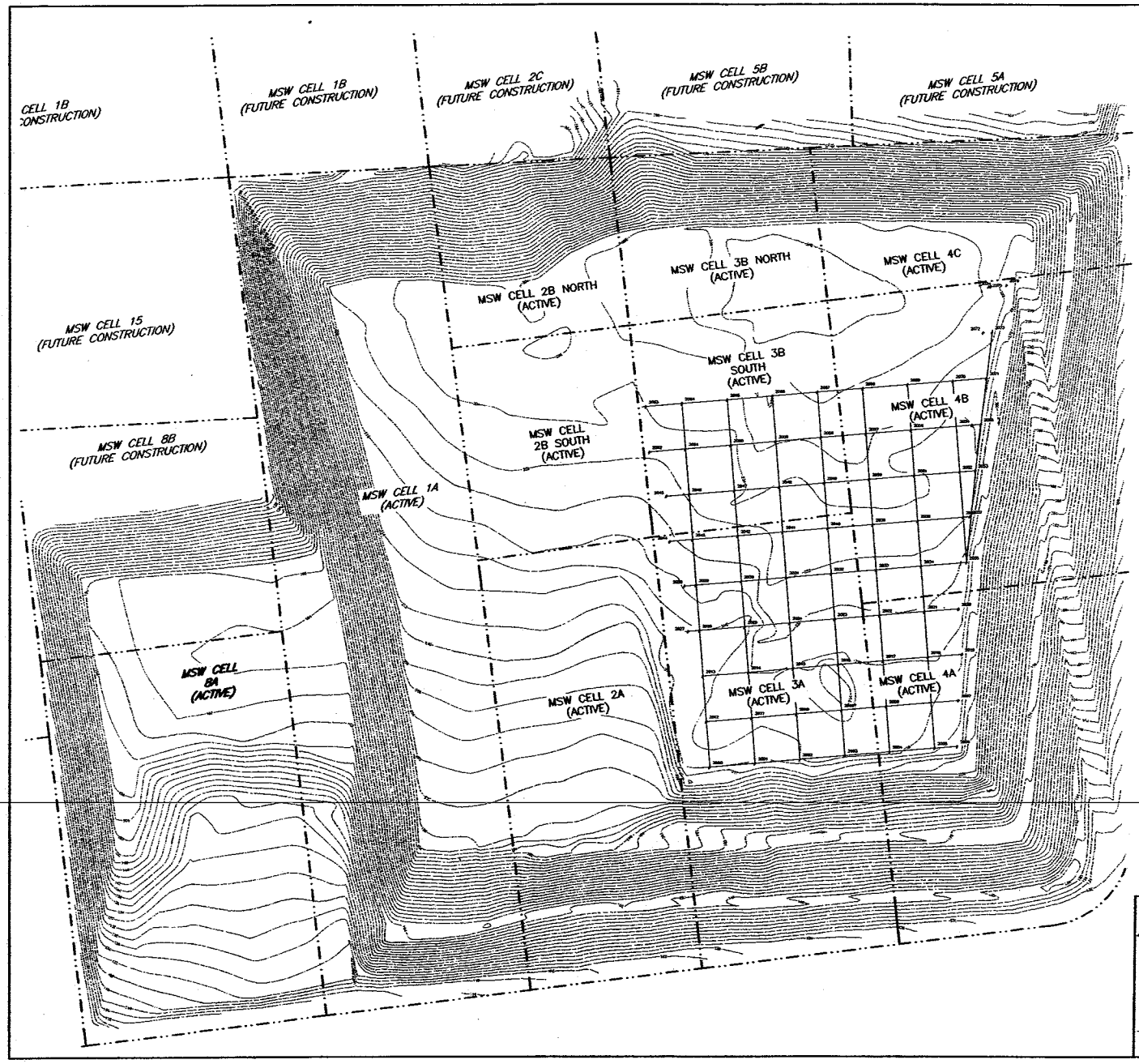

NORTH

NOTES:

1. TOPOGRAPHIC INFORMATION IS FROM AN ELECTRONIC FILE BY FLORA SURVEYING OF A SURVEY CONDUCTED ON

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SCALE IN FEET

GeoSyntec Consultants
COLUMBIA, MARYLAND
(410)381-4333

REV.	DATE	DESCRIPTION	DR BY	APP BY

DATE: NOVEMBER 2002		PROJECT NO. ME0284	SCALE: 1" = 100'	
DES BY	DTM	NOV 02	PROJECT: KING GEORGE COUNTY LANDFILL KING GEORGE COUNTY, VIRGINIA	
DRN BY	JOC	NOV 02		
CHK BY	MFH	NOV 02	SHEET TITLE: EXISTING CONDITIONS SITE PLAN	
REV BY				
APP BY				

SIGNATURE

DATE

WASTE MANAGEMENT, INC.

FILE NO: 0284-001

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APPENDIX A - LEACHATE QUALITY TEST RESULTS

(available upon request)

APPENDIX B - DAILY LIQUID APPLICATION LOG

(available upon request)

APPENDIX C - TRENCH MONITORING LOG

(available upon request)

APPENDIX D - SETTLEMENT D
(available upon request)

APPENDIX E - LANDFILL GAS DATA

(summary data included, complete data available upon request)

ENGINEERING, INC.

Waste Industry Experts

Joyce Engineering, Inc
4808 Radford Ave
Richmond, VA 23230

tel: 804/355-4520
fax: 804/355-4282

www.JoyceEngineering.com

January 31, 2003

Mr. Douglas Mandeville
Senior Staff Engineer
Geosyntec Consultants, Inc.
10015 Old Columbia Road
Suite A-200
Columbia, Maryland 21046

Re: New King George County Landfill, Permit No. 586
XL Project Sampling Results – September, October, and November 2002
JEI Project No. 464.00/Task No. 20/File Nos. 4.2 and 6.2

Dear Mr. Mandeville:

Please find attached the September, October, and November 2002 results for leachate and landfill gas sampling and monitoring conducted at the New King George County Landfill for the XL Program. A brief summary of each activity is presented below.

Surface Emissions Monitoring

Joyce Engineering, Inc. (JEI) performed surface emissions monitoring (SEM) at the New King George County Landfill on September 27 and November 25, 2002. Please note, the October 2002 SEM event was conducted by another Waste Management, Inc. (WMI) consultant; therefore, these results are not included.

The monitoring was performed using a Foxboro TVA 1000B flame ionization detector. The instrument was calibrated in accordance with EPA Method 21 prior to the events. Attached are the calibration data forms (see Attachment 1). JEI field personnel walked the site, monitoring and logging points at 30-meter intervals, with the distance between pathways not greater than 30 meters. Drawings presented in Attachment 2 depict the routes followed by JEI personnel during the September and November 2002 SEM events. Please note that the monitoring route is altered each event due to landfilling activity.

The instrument was programmed to continuously monitor while walking along the pathway. The instrument was also programmed to sound an audible alarm if methane concentrations at the surface exceeded 500 parts per million (ppm) over background (see the calibration data form for background checks). The September and November 2002 methane measurements were data-logged and are also presented in Attachment 1. There were no methane

measurements above the 500-ppm limit. Therefore, the requirements set forth in 40 CFR 60.755.c have been satisfied for the September and November 2002 XL Project SEM events.

Leachate Sampling

On September 27, October 28, November 15, and November 25, 2002, JEI personnel collected leachate samples for the XL Program. Five leachate samples were collected from leachate collection sumps, and one sample was collected from the leachate holding tank during the September, October, and November 2002 leachate sampling events. In addition, a field blank was collected, and a laboratory-supplied trip blank accompanied the samples. After collection, the samples were placed in a cooler on ice and shipped to Severn Trent Laboratories (STL) of Amherst, New York, and Microbial Insight (MI) of Rockford, Tennessee, for analysis of biochemical oxygen demand (BOD), sulfate, chemical oxygen demand (COD), chloride, total organic carbon (TOC), potassium, volatile organic compounds, volatile organic acids, semi-volatile organic compounds, RCRA hazardous metals, ammonia-nitrogen, phosphorus, total Kjeldahl Nitrogen (TKN), total dissolved solids (TDS), pesticides, herbicides, nitrate, nitrite, ortho-phosphate, sodium, magnesium, calcium, bicarbonate/carbonate, and polychlorinated biphenyls (PCBs). In addition, field measurements of pH, specific conductance, and temperature were collected at the time of sampling.

Please note samples were not collected for volatile organic acids analysis during the October 2002 leachate sampling event. Field sampling forms, chain-of-custody forms, and laboratory certificates-of-analysis for the September, October, and November 2002 leachate sampling events are presented in Attachment 3.

Landfill Gas Extraction Well Monitoring

On September 27 and 30, October 9, and November 14, 2002, JEI personnel collected landfill gas (LFG) measurements of methane, carbon dioxide, oxygen, balance gases, and hydrogen sulfide from 33 LFG extraction wells. Please note that hydrogen sulfide measurements were not collected during the September 2002 LFG monitoring event. In addition, measurements of temperature, flow rate, static vacuum, and differential pressure were recorded. Measurements were recorded using a CES-LandTEC GEM 500 instrument. Hydrogen sulfide measurements were recorded using an Industrial Scientific instrument. Both instruments were calibrated with a known calibration standard before and after use during each event. A table displaying the LFG monitoring results is presented in Attachment 4.

Landfill Gas Sampling

On October 9 and November 14, 2002, JEI personnel collected samples from the landfill gas collection system. Six-liter suma canister samples were collected from the western, central, and eastern header pipe of the landfill gas collection system and from a location downstream of the landfill gas collection system blower. The samples were sent to STL of Los Angeles,

California, for analysis of volatile organic compounds by EPA Method TO-15, methane, oxygen, carbon dioxide, nitrogen, and NMOCs by ASTM methods. Chain-of-custody forms and laboratory certificates-of-analyses for the October and November 2002 LFG samples are presented in Attachment 5.

Please feel free to contact me at 804-355-4520 or at mwilliams@joyceengineering.com if you have any questions concerning the XL Program results presented herein.

Sincerely,
JOYCE ENGINEERING, INC.

Michael G. Williams, C.P.G.
Senior Project Hydrogeologist

Attachments:
Attachment 1 - SEM Calibration Logs and NSPS SEM Monitoring Data: September and November 2002
Attachment 2 - SEM Route Drawings
Attachment 3 - Leachate Sampling Chain-of-Custody Forms and Laboratory Certificates-of-Analysis: September, October, and November 2002
Attachment 4 - Landfill Gas Extraction Well Monitoring Data
Attachment 5 - Landfill Gas Sampling Chain-of-Custody Forms and Laboratory Certificates-of-Analysis: October and November 2002

C: James Stenborg, P.E., WMI
Howard Burns, WMI
David McMillan, JEI (letter only)

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Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
XL Project
September 27, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
27-Sep-02	10:28:53	1	38.19	OK	
27-Sep-02	10:29:37	2	25.02	OK	
27-Sep-02	10:30:22	3	17.33	OK	
27-Sep-02	10:31:18	4	62.51	OK	
27-Sep-02	10:33:31	5	95.39	OK	
27-Sep-02	10:34:16	6	90.91	OK	
27-Sep-02	10:34:58	7	52.63	OK	
27-Sep-02	10:37:02	8	44.11	OK	
27-Sep-02	10:37:39	9	18.51	OK	
27-Sep-02	10:38:23	10	8.31	OK	
27-Sep-02	10:45:46	11	10.51	OK	
27-Sep-02	10:46:27	12	25.82	OK	
27-Sep-02	10:47:18	13	25.07	OK	
27-Sep-02	10:48:04	14	18.89	OK	
27-Sep-02	10:49:19	15	7.75	OK	
27-Sep-02	10:51:23	16	6.53	OK	
27-Sep-02	10:52:04	17	5.82	OK	
27-Sep-02	10:52:41	18	5.55	OK	
27-Sep-02	10:53:23	19	4.92	OK	
27-Sep-02	10:54:10	20	4.46	OK	
27-Sep-02	10:54:52	21	5.7	OK	
27-Sep-02	10:55:54	22	4.95	OK	
27-Sep-02	10:56:35	23	5.04	OK	
27-Sep-02	10:57:15	24	4.82	OK	
27-Sep-02	10:57:58	25	11.95	OK	
27-Sep-02	10:58:37	26	11.26	OK	
27-Sep-02	10:59:25	27	13.6	OK	
27-Sep-02	11:00:19	28	163	OK	
27-Sep-02	11:03:25	29	15.35	OK	
27-Sep-02	11:04:08	30	5.94	OK	
27-Sep-02	11:05:03	31	52.71	OK	
27-Sep-02	11:06:04	32	47.68	OK	
27-Sep-02	11:06:55	33	55.75	OK	
27-Sep-02	11:07:40	34	45.02	OK	
27-Sep-02	11:08:27	35	71.95	OK	
27-Sep-02	11:09:29	36	60.25	OK	
27-Sep-02	11:10:19	37	86.14	OK	
27-Sep-02	11:11:10	38	191	OK	
27-Sep-02	11:11:56	39	91.22	OK	
27-Sep-02	11:12:45	40	138	OK	
27-Sep-02	11:13:38	41	54.13	OK	
27-Sep-02	11:15:09	42	36.43	OK	
27-Sep-02	11:27:08	43	83.29	OK	
27-Sep-02	11:28:04	44	73.93	OK	
27-Sep-02	11:28:50	45	29.01	OK	
27-Sep-02	11:29:29	46	34.45	OK	
27-Sep-02	11:30:17	47	76.94	OK	
27-Sep-02	11:33:17	48	24.42	OK	
27-Sep-02	11:34:03	49	43.17	OK	
27-Sep-02	11:34:59	50	31.86	OK	
27-Sep-02	11:36:02	51	17.94	OK	

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
XL Project
September 27, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
27-Sep-02	11:37:24	52	17.43	OK	
27-Sep-02	11:38:20	53	26.18	OK	
27-Sep-02	11:40:38	54	18.76	OK	
27-Sep-02	11:42:03	55	16.44	OK	
27-Sep-02	11:42:46	56	11.84	OK	
27-Sep-02	11:43:31	57	20.5	OK	
27-Sep-02	11:44:11	58	23.38	OK	
27-Sep-02	11:45:12	59	17.62	OK	
27-Sep-02	11:46:16	60	48.6	OK	
27-Sep-02	11:47:25	61	31.19	OK	
27-Sep-02	11:48:09	62	11.37	OK	
27-Sep-02	11:48:51	63	23.26	OK	
27-Sep-02	11:52:20	64	21.59	OK	
27-Sep-02	11:53:40	65	24.08	OK	
27-Sep-02	11:54:24	66	52.45	OK	
27-Sep-02	11:55:12	67	59.29	OK	
27-Sep-02	11:56:00	68	53.64	OK	
27-Sep-02	11:56:43	69	63.73	OK	
27-Sep-02	11:58:14	70	25.04	OK	
27-Sep-02	11:59:21	71	15.87	OK	
27-Sep-02	12:00:06	72	15.32	OK	
27-Sep-02	12:01:08	73	19.11	OK	
27-Sep-02	12:02:01	74	18.24	OK	
27-Sep-02	12:02:47	75	32.76	OK	
27-Sep-02	12:04:01	76	18.37	OK	
27-Sep-02	12:04:52	77	67.5	OK	
27-Sep-02	12:06:38	78	29.43	OK	
27-Sep-02	12:07:24	79	29.46	OK	
27-Sep-02	12:08:38	80	19.3	OK	
27-Sep-02	12:10:09	81	17.01	OK	
27-Sep-02	12:10:51	82	24.05	OK	
27-Sep-02	12:11:42	83	33.99	OK	
27-Sep-02	12:12:36	84	22.65	OK	
27-Sep-02	12:13:48	85	16.33	OK	
27-Sep-02	12:14:52	86	16.51	OK	
27-Sep-02	12:15:37	87	47.15	OK	
27-Sep-02	12:17:12	88	25.74	OK	
27-Sep-02	12:17:53	89	41.73	OK	
27-Sep-02	12:18:40	90	46.46	OK	
27-Sep-02	12:19:21	91	61.9	OK	
27-Sep-02	12:20:05	92	12.67	OK	
27-Sep-02	12:20:58	93	14.98	OK	
27-Sep-02	12:21:41	94	15.94	OK	
27-Sep-02	12:22:30	95	17.54	OK	
27-Sep-02	12:23:24	96	11.57	OK	
27-Sep-02	12:24:29	97	36.13	OK	
27-Sep-02	12:25:11	98	34.72	OK	
27-Sep-02	12:26:14	99	33.15	OK	
27-Sep-02	12:27:04	100	11.37	OK	
27-Sep-02	12:27:50	101	29.68	OK	
27-Sep-02	12:28:44	102	33.91	OK	
27-Sep-02	12:29:42	103	25.66	OK	
27-Sep-02	12:30:26	104	21.89	OK	
27-Sep-02	12:31:13	105	53.5	OK	

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
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September 27, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
27-Sep-02	12:32:02	106	53.04	OK	
27-Sep-02	12:32:57	107	21.34	OK	
27-Sep-02	12:33:47	108	23.82	OK	
27-Sep-02	12:34:36	109	18	OK	
27-Sep-02	12:35:20	110	17.87	OK	
27-Sep-02	12:36:53	111	25.17	OK	
27-Sep-02	12:37:43	112	33.65	OK	
27-Sep-02	12:38:41	113	17.63	OK	
27-Sep-02	12:40:04	114	13.66	OK	
27-Sep-02	12:41:00	115	14.45	OK	
27-Sep-02	12:42:35	116	16.23	OK	
27-Sep-02	12:43:30	117	21.29	OK	
27-Sep-02	12:46:15	118	14.7	OK	
27-Sep-02	12:47:16	119	17.94	OK	
27-Sep-02	12:48:16	120	14.89	OK	
27-Sep-02	12:49:03	121	18.26	OK	
27-Sep-02	12:49:51	122	18.27	OK	
27-Sep-02	12:50:45	123	28.75	OK	
27-Sep-02	12:52:38	124	70.36	OK	
27-Sep-02	12:56:29	125	6.03	OK	
27-Sep-02	12:57:50	126	9.77	OK	
27-Sep-02	13:08:20	127	36.41	OK	
27-Sep-02	13:09:04	128	19.59	OK	
27-Sep-02	13:09:52	129	34.01	OK	
27-Sep-02	13:14:56	130	41.49	OK	
27-Sep-02	13:15:42	131	37.64	OK	
27-Sep-02	13:16:27	132	23.67	OK	
27-Sep-02	13:17:14	133	22.23	OK	
27-Sep-02	13:17:58	134	30.24	OK	
27-Sep-02	13:18:44	135	21.61	OK	
27-Sep-02	13:21:12	136	30.69	OK	
27-Sep-02	13:22:04	137	33.83	OK	
27-Sep-02	13:22:43	138	28.32	OK	
27-Sep-02	13:23:36	139	18.25	OK	
27-Sep-02	13:24:29	140	18.64	OK	
27-Sep-02	13:25:10	141	18.53	OK	
27-Sep-02	13:25:57	142	21.71	OK	
27-Sep-02	13:26:42	143	30.44	OK	
27-Sep-02	13:27:37	144	36.95	OK	
27-Sep-02	13:28:30	145	36.71	OK	
27-Sep-02	13:29:14	146	29.31	OK	
27-Sep-02	13:30:00	147	45.94	OK	
27-Sep-02	13:31:11	148	42.56	OK	
27-Sep-02	13:31:56	149	31.46	OK	
27-Sep-02	13:32:46	150	19.22	OK	
27-Sep-02	13:33:39	151	20.32	OK	
27-Sep-02	13:34:33	152	31.29	OK	
27-Sep-02	13:35:25	153	12.98	OK	
27-Sep-02	13:37:47	154	24.99	OK	
27-Sep-02	13:38:33	155	98.63	OK	
27-Sep-02	13:39:20	156	58.04	OK	
27-Sep-02	13:40:42	157	23.94	OK	
27-Sep-02	13:41:32	158	47.79	OK	
27-Sep-02	13:42:19	159	34.52	OK	
27-Sep-02	13:43:06	160	33.13	OK	

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
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September 27, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
27-Sep-02	13:43:52	161	18.95	OK	
27-Sep-02	13:44:38	162	21.45	OK	
27-Sep-02	13:45:24	163	19.27	OK	
27-Sep-02	13:46:23	164	22.42	OK	
27-Sep-02	13:47:17	165	16.35	OK	
27-Sep-02	13:48:06	166	15.17	OK	
27-Sep-02	13:48:48	167	16.47	OK	
27-Sep-02	13:49:37	168	24.6	OK	
27-Sep-02	13:51:03	169	36.19	OK	
27-Sep-02	13:52:00	170	43.41	OK	
27-Sep-02	13:52:44	171	77.31	OK	
27-Sep-02	13:53:33	172	38.8	OK	
27-Sep-02	13:55:01	173	45.91	OK	
27-Sep-02	13:55:56	174	41.51	OK	
27-Sep-02	13:57:17	175	39.58	OK	
27-Sep-02	13:58:01	176	14.65	OK	
27-Sep-02	13:58:56	177	12.98	OK	
27-Sep-02	13:59:45	178	15.52	OK	
27-Sep-02	14:00:38	179	55.21	OK	
27-Sep-02	14:01:30	180	54.39	OK	
27-Sep-02	14:02:16	181	21.01	OK	
27-Sep-02	14:03:16	182	15.1	OK	
27-Sep-02	14:10:01	183	8	OK	
27-Sep-02	14:10:54	184	12.89	OK	
27-Sep-02	14:11:41	185	12.86	OK	
27-Sep-02	14:12:31	186	24.88	OK	
27-Sep-02	14:13:32	187	40.38	OK	
27-Sep-02	14:14:32	188	15.69	OK	
27-Sep-02	14:15:21	189	19.4	OK	
27-Sep-02	14:16:09	190	23.42	OK	
27-Sep-02	14:17:37	191	28.42	OK	
27-Sep-02	14:18:23	192	89.14	OK	
27-Sep-02	14:19:11	193	35.11	OK	
27-Sep-02	14:19:56	194	34.9	OK	
27-Sep-02	14:20:39	195	14.73	OK	
27-Sep-02	14:21:25	196	22.62	OK	
27-Sep-02	14:22:09	197	61.27	OK	
27-Sep-02	14:22:50	198	16.62	OK	
27-Sep-02	14:23:34	199	14.83	OK	
27-Sep-02	14:24:22	200	29.92	OK	
27-Sep-02	14:25:10	201	27.45	OK	
27-Sep-02	14:26:01	202	21.45	OK	
27-Sep-02	14:26:49	203	20.46	OK	
27-Sep-02	14:27:38	204	13.21	OK	
27-Sep-02	14:28:47	205	27.2	OK	
27-Sep-02	14:29:31	206	31.6	OK	
27-Sep-02	14:30:19	207	15.72	OK	
27-Sep-02	14:31:01	208	8.82	OK	
27-Sep-02	14:31:48	209	8.45	OK	
27-Sep-02	14:32:26	210	9.37	OK	
27-Sep-02	14:33:07	211	12.97	OK	
27-Sep-02	14:33:51	212	12.89	OK	
27-Sep-02	14:34:35	213	12.96	OK	
27-Sep-02	14:35:16	214	22.64	OK	
27-Sep-02	14:36:01	215	10.1	OK	
27-Sep-02	14:36:47	216	13.59	OK	

No. of points monitored: 216 Background Upwind: 5.62 ppm
No. of exceedence points: 0 Background Downwind: 14.46 ppm

NOTES:
Weather: Overcast, highs in the low to mid 70s.
Barometric pressure average 29.56 inches of mercury

Instrument: Foxboro TVA-1000B; ID Number 69426

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
XL Project
November 25, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
25-Nov-02	11:01:18	1	26.92	OK	
25-Nov-02	11:02:20	2	18.6	OK	
25-Nov-02	11:03:06	3	19.47	OK	
25-Nov-02	11:04:07	4	7.57	OK	
25-Nov-02	11:04:50	5	8.79	OK	
25-Nov-02	11:05:47	6	16.15	OK	
25-Nov-02	11:06:45	7	3.63	OK	
25-Nov-02	11:07:36	8	6.23	OK	
25-Nov-02	11:08:16	9	9.12	OK	
25-Nov-02	11:09:12	10	5.28	OK	
25-Nov-02	11:11:39	11	21.82	OK	
25-Nov-02	11:12:36	12	3.19	OK	
25-Nov-02	11:13:25	13	3.01	OK	
25-Nov-02	11:14:10	14	5.05	OK	
25-Nov-02	11:14:56	15	6.48	OK	
25-Nov-02	11:15:55	16	8.14	OK	
25-Nov-02	11:16:46	17	14.1	OK	
25-Nov-02	11:17:32	18	12.05	OK	
25-Nov-02	11:18:20	19	10	OK	
25-Nov-02	11:19:15	20	7.5	OK	
25-Nov-02	11:20:22	21	4.47	OK	
25-Nov-02	11:21:05	22	3.89	OK	
25-Nov-02	11:21:48	23	3.65	OK	
25-Nov-02	11:22:36	24	3.89	OK	
25-Nov-02	11:23:22	25	3.62	OK	
25-Nov-02	11:24:05	26	3.54	OK	
25-Nov-02	11:25:05	27	4.46	OK	
25-Nov-02	11:26:02	28	3.25	OK	
25-Nov-02	11:26:59	29	28.84	OK	
25-Nov-02	11:28:08	30	66.17	OK	
25-Nov-02	11:28:54	31	27.45	OK	
25-Nov-02	11:29:49	32	10.47	OK	
25-Nov-02	11:30:42	33	9.08	OK	
25-Nov-02	11:31:26	34	7.97	OK	
25-Nov-02	11:32:15	35	6.75	OK	
25-Nov-02	11:32:59	36	5.79	OK	
25-Nov-02	11:33:39	37	14.83	OK	
25-Nov-02	11:34:27	38	9.96	OK	
25-Nov-02	11:35:14	39	8.76	OK	
25-Nov-02	11:36:21	40	39.1	OK	
25-Nov-02	11:37:24	41	194	OK	
25-Nov-02	11:38:41	42	119	OK	
25-Nov-02	11:54:53	43	143	OK	
25-Nov-02	11:56:46	44	74.39	OK	
25-Nov-02	11:57:57	45	87.71	OK	
25-Nov-02	11:59:07	46	29.64	OK	
25-Nov-02	12:00:31	47	5.02	OK	
25-Nov-02	12:01:33	48	51.96	OK	
25-Nov-02	12:02:23	49	91.43	OK	
25-Nov-02	12:03:38	50	25.51	OK	
25-Nov-02	12:05:22	51	10.45	OK	

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
XL Project
November 25, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
25-Nov-02	12:06:17	52	53.38	OK	
25-Nov-02	12:07:14	53	13.61	OK	
25-Nov-02	12:08:59	54	11.41	OK	
25-Nov-02	12:09:53	55	16.44	OK	
25-Nov-02	12:11:36	56	10.8	OK	
25-Nov-02	12:12:34	57	12.18	OK	
25-Nov-02	12:13:47	58	23.98	OK	
25-Nov-02	12:16:57	59	37.21	OK	
25-Nov-02	12:18:22	60	32.67	OK	
25-Nov-02	12:19:21	61	19.71	OK	
25-Nov-02	12:20:09	62	14.25	OK	
25-Nov-02	12:20:56	63	33.91	OK	
25-Nov-02	12:25:30	64	137	OK	
25-Nov-02	12:26:29	65	35.3	OK	
25-Nov-02	12:27:26	66	27.73	OK	
25-Nov-02	12:28:34	67	78.58	OK	
25-Nov-02	12:29:25	68	38	OK	
25-Nov-02	12:30:27	69	70.98	OK	
25-Nov-02	12:31:28	70	123	OK	
25-Nov-02	12:32:25	71	39.92	OK	
25-Nov-02	12:33:26	72	46.45	OK	
25-Nov-02	12:34:42	73	85.85	OK	
25-Nov-02	12:35:50	74	60.55	OK	
25-Nov-02	12:37:11	75	30.53	OK	
25-Nov-02	12:38:18	76	14.95	OK	
25-Nov-02	12:39:57	77	12.07	OK	
25-Nov-02	12:41:19	78	4.98	OK	
25-Nov-02	12:42:19	79	3.74	OK	
25-Nov-02	12:43:22	80	2.88	OK	
25-Nov-02	12:44:25	81	2.11	OK	
25-Nov-02	12:45:32	82	1.68	OK	
25-Nov-02	12:46:28	83	2.97	OK	
25-Nov-02	12:48:16	84	3.14	OK	
25-Nov-02	12:49:12	85	5.36	OK	
25-Nov-02	12:50:03	86	23.66	OK	
25-Nov-02	12:51:08	87	5.92	OK	
25-Nov-02	12:52:04	88	3.12	OK	
25-Nov-02	12:53:05	89	8.81	OK	
25-Nov-02	12:53:59	90	16.74	OK	
25-Nov-02	12:55:08	91	15.25	OK	
25-Nov-02	12:56:13	92	6.55	OK	
25-Nov-02	12:57:11	93	14.07	OK	
25-Nov-02	12:58:05	94	15.43	OK	
25-Nov-02	12:58:57	95	17.32	OK	
25-Nov-02	13:01:19	96	25.58	OK	
25-Nov-02	13:02:14	97	18.74	OK	
25-Nov-02	13:03:35	98	9.98	OK	
25-Nov-02	13:04:50	99	23.15	OK	
25-Nov-02	13:05:43	100	9.52	OK	
25-Nov-02	13:06:48	101	61.84	OK	
25-Nov-02	13:08:21	102	48.79	OK	
25-Nov-02	13:09:22	103	31.84	OK	
25-Nov-02	13:10:10	104	41.18	OK	
25-Nov-02	13:12:58	105	9.79	OK	

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
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November 25, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
25-Nov-02	13:13:53	106	17.57	OK	
25-Nov-02	13:14:44	107	74.82	OK	
25-Nov-02	13:15:35	108	17.76	OK	
25-Nov-02	13:16:41	109	15.72	OK	
25-Nov-02	13:17:29	110	31.55	OK	
25-Nov-02	13:19:21	111	79.27	OK	
25-Nov-02	13:20:22	112	27.47	OK	
25-Nov-02	13:21:14	113	45.5	OK	
25-Nov-02	13:22:13	114	45.03	OK	
25-Nov-02	13:23:11	115	27.56	OK	
25-Nov-02	13:24:31	116	142	OK	
25-Nov-02	13:25:45	117	14.67	OK	
25-Nov-02	13:27:07	118	2.23	OK	
25-Nov-02	13:28:18	119	2.03	OK	
25-Nov-02	13:29:13	120	3.74	OK	
25-Nov-02	13:30:02	121	13.94	OK	
25-Nov-02	13:31:05	122	3.62	OK	
25-Nov-02	13:31:51	123	5.87	OK	
25-Nov-02	13:32:43	124	38.46	OK	
25-Nov-02	13:33:33	125	30.5	OK	
25-Nov-02	13:34:43	126	18.08	OK	
25-Nov-02	13:35:49	127	28.73	OK	
25-Nov-02	13:36:56	128	13.65	OK	
25-Nov-02	13:42:08	129	35.45	OK	
25-Nov-02	13:48:21	130	11.25	OK	
25-Nov-02	13:49:10	131	17.65	OK	
25-Nov-02	13:50:17	132	8.32	OK	
25-Nov-02	13:51:23	133	13.75	OK	
25-Nov-02	13:52:32	134	13.07	OK	
25-Nov-02	13:53:25	135	7.07	OK	
25-Nov-02	13:54:23	136	11.56	OK	
25-Nov-02	13:55:18	137	21.63	OK	
25-Nov-02	13:56:09	138	8.87	OK	
25-Nov-02	13:56:56	139	12.79	OK	
25-Nov-02	13:57:44	140	7.52	OK	
25-Nov-02	13:58:33	141	10.7	OK	
25-Nov-02	14:00:41	142	5.44	OK	
25-Nov-02	14:01:53	143	18.37	OK	
25-Nov-02	14:02:42	144	18.2	OK	
25-Nov-02	14:04:09	145	17.41	OK	
25-Nov-02	14:05:05	146	17.54	OK	
25-Nov-02	14:05:48	147	11.19	OK	
25-Nov-02	14:07:29	148	7.53	OK	
25-Nov-02	14:08:16	149	6.71	OK	
25-Nov-02	14:09:25	150	126	OK	
25-Nov-02	14:10:29	151	17.7	OK	
25-Nov-02	14:11:24	152	9.51	OK	
25-Nov-02	14:12:18	153	7.26	OK	
25-Nov-02	14:13:28	154	44.21	OK	
25-Nov-02	14:15:03	155	13.77	OK	
25-Nov-02	14:16:37	156	27.97	OK	
25-Nov-02	14:18:34	157	20.39	OK	
25-Nov-02	14:21:50	158	12.54	OK	
25-Nov-02	14:23:55	159	24.03	OK	
25-Nov-02	14:25:01	160	12.16	OK	

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
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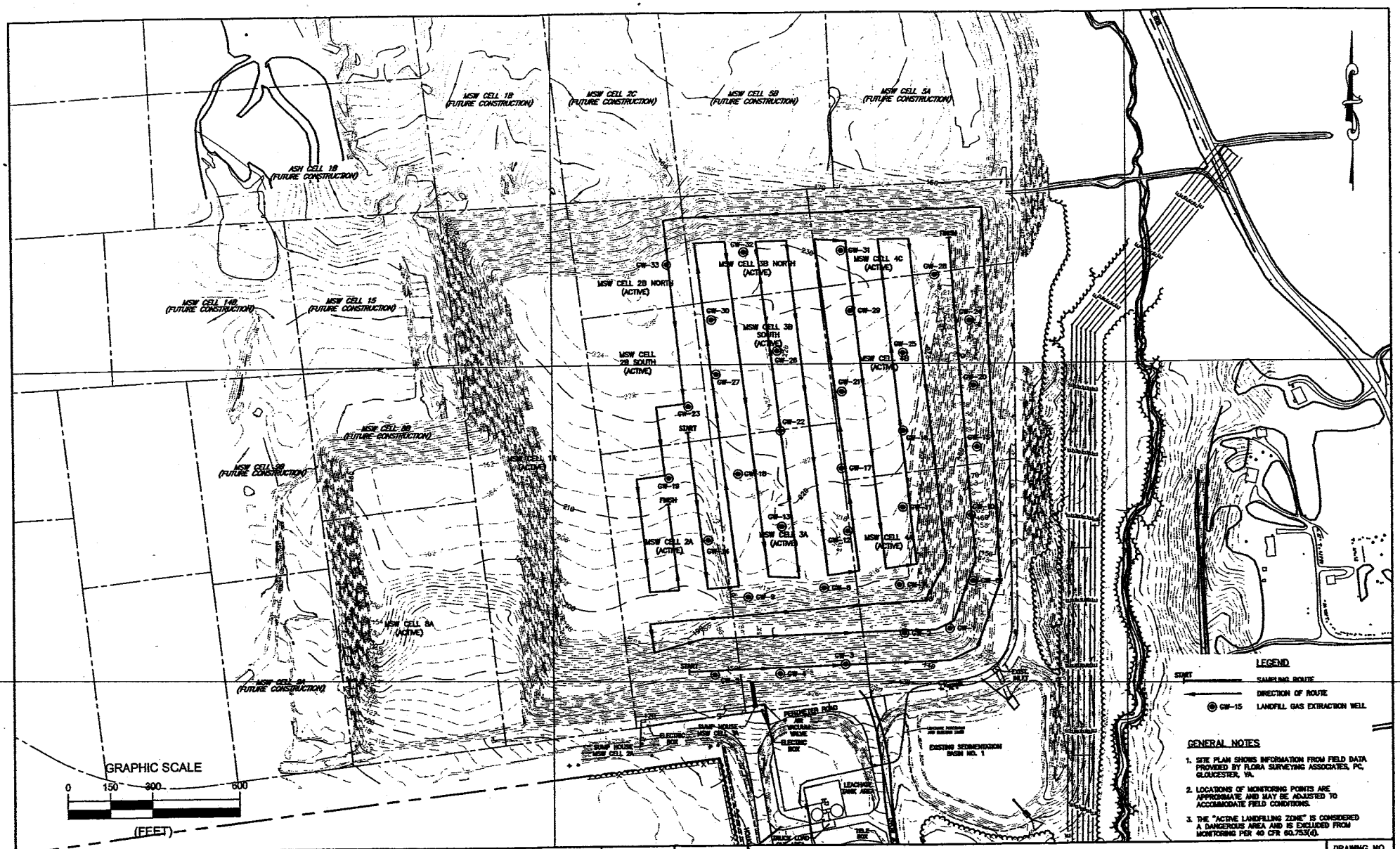
November 25, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
25-Nov-02	14:27:29	161	16.88	OK	
25-Nov-02	14:28:24	162	15.15	OK	
25-Nov-02	14:29:24	163	16.03	OK	
25-Nov-02	14:30:17	164	12.74	OK	
25-Nov-02	14:31:23	165	7.9	OK	
25-Nov-02	14:32:31	166	13.2	OK	
25-Nov-02	14:33:32	167	18.18	OK	
25-Nov-02	14:34:23	168	12.71	OK	
25-Nov-02	14:35:10	169	20.84	OK	
25-Nov-02	14:36:33	170	14.28	OK	
25-Nov-02	14:38:03	171	104	OK	
25-Nov-02	14:38:49	172	24.3	OK	
25-Nov-02	14:39:45	173	3.69	OK	
25-Nov-02	14:40:45	174	5.97	OK	
25-Nov-02	14:41:55	175	7.42	OK	
25-Nov-02	14:43:07	176	23.42	OK	
25-Nov-02	14:44:04	177	28.12	OK	
25-Nov-02	14:44:52	178	5.62	OK	
25-Nov-02	14:46:06	179	7.82	OK	
25-Nov-02	14:47:37	180	10.64	OK	
25-Nov-02	14:48:38	181	12.1	OK	
25-Nov-02	14:51:03	182	27.3	OK	
25-Nov-02	14:53:09	183	13.39	OK	
25-Nov-02	14:54:01	184	5.9	OK	
25-Nov-02	14:54:52	185	7.02	OK	
25-Nov-02	14:55:50	186	6.22	OK	
25-Nov-02	14:56:40	187	5.11	OK	
25-Nov-02	14:57:26	188	6.52	OK	
25-Nov-02	14:58:24	189	5.65	OK	
25-Nov-02	14:59:19	190	6.19	OK	
25-Nov-02	15:03:44	191	51.16	OK	
25-Nov-02	15:05:16	192	33.62	OK	
25-Nov-02	15:06:19	193	25.39	OK	
25-Nov-02	15:07:26	194	18.22	OK	
25-Nov-02	15:09:35	195	175	OK	
25-Nov-02	15:11:25	196	76.76	OK	
25-Nov-02	15:12:20	197	46.21	OK	
25-Nov-02	15:13:25	198	51.45	OK	
25-Nov-02	15:14:23	199	36.1	OK	
25-Nov-02	15:15:20	200	51.31	OK	
25-Nov-02	15:16:17	201	25	OK	
25-Nov-02	15:17:30	202	12.15	OK	
25-Nov-02	15:18:46	203	15.01	OK	
25-Nov-02	15:20:01	204	128	OK	
25-Nov-02	15:22:11	205	38.62	OK	
25-Nov-02	15:24:19	206	13.83	OK	
25-Nov-02	15:25:35	207	18.78	OK	
25-Nov-02	15:26:35	208	7.83	OK	
25-Nov-02	15:27:31	209	14.31	OK	
25-Nov-02	15:28:34	210	18.37	OK	
25-Nov-02	15:29:31	211	38.88	OK	
25-Nov-02	15:30:28	212	23.94	OK	
25-Nov-02	15:31:30	213	56.77	OK	

No. of points monitored: 213 Background Upwind: 2.98 ppm
No. of exceedance points: 0 Background Downwind: 5.42 ppm

NOTES:
Weather: Sunny, highs in the low to mid 60s.
Barometric pressure average 30.04 inches of mercury

Instrument: Foxboro TVA-1000B; ID Number 18787439



DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

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DESIGNED
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CHECKED
APPROVED
DATE 10/7/02

JOYCE ENGINEERING, INC.
4808 RADFORD AVENUE
RICHMOND, VA 23230-3508
PHONE: (804) 355-4529
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SCALE	PROJECT NO.
1"=300'	464.19

WASTE MANAGEMENT, INC. – KING GEORGE COUNTY LANDFILL
KING GEORGE, VIRGINIA
XL PROJECT – SURFACE EMISSIONS MONITORING PLAN – 9/27/02

DRAWING NO. 1

ENGINEERING, INC.

Waste Industry Experts

Joyce Engineering, Inc
4808 Radford Ave
Richmond, VA 23230

tel: 804/355-4520
fax: 804/355-4282

www.JoyceEngineering.com

February 13, 2003

Douglas Mandeville
Senior Staff Engineer
Geosyntec Consultants, Inc.
10015 Old Columbia Road
Suite A-200
Columbia, Maryland 21046

Re: New King George County Landfill Permit No. 586
XL Project Sampling Results—December 2002
JEI Project No. 464.00/Task No. 20/File Nos. 4.2 and 6.2

Dear Mr. Mandeville:

Please find attached the December 2002 results for leachate and landfill gas sampling and monitoring conducted at the New King George County Landfill for the XL Program. A brief summary of each activity is presented below.

Surface Emissions Monitoring

Joyce Engineering, Inc. (JEI) performed surface emissions monitoring (SEM) at the New King George County Landfill on December 19, 2002. The monitoring was performed using a Foxboro TVA 1000B flame ionization detector. The instrument was calibrated in accordance with Environmental Protection Agency (EPA) Method 21 prior to the event. The calibration data form is presented in Attachment 1. JEI field personnel walked the site, monitoring and logging points at 30-meter intervals, with the distance between pathways not greater than 30 meters. A drawing presented in Attachment 2 depicts the route followed by JEI personnel during the December 2002 SEM event. Please note that the monitoring route is altered from previous events due to landfilling activity.

The instrument was programmed to continuously monitor while walking along the pathway. The instrument was also programmed to sound an audible alarm if methane concentrations at the surface exceeded 500 parts per million (ppm) over background (see the calibration data form for background checks). The December 2002 methane measurements were data-logged and are also presented in Attachment 1. There were no methane measurements above the 500-ppm limit. Therefore, the requirements set forth in 40 CFR 60.755.c have been satisfied for the December 2002 XL Project SEM event.

Leachate Sampling

On December 19, 2002, JEI personnel collected leachate samples for the XL Program. Five leachate samples were collected from leachate collection sumps, and one sample was collected from the leachate holding tank during the December 2002 leachate sampling event. In addition, a field blank was collected, and a laboratory-supplied trip blank accompanied the samples. After collection the samples were placed in a cooler on ice and shipped to Severn Trent Laboratories (STL) of Amherst, New York, and Microbial Insight (MI) of Rockford, Tennessee, for analysis of biochemical oxygen demand (BOD), sulfate, chemical oxygen demand (COD), chloride, total organic carbon (TOC), potassium, volatile organic compounds, volatile organic acids, semi-volatile organic compounds, RCRA hazardous metals, ammonia-nitrogen, phosphorus, total Kjeldahl nitrogen (TKN), total dissolved solids (TDS), nitrate, nitrite, sulfide, cyanide, total phosphate, ortho-phosphate, sodium, magnesium, calcium, and bicarbonate/carbonate. In addition, field measurements of pH, specific conductance, and temperature were collected at the time of sampling.

Field sampling forms, chain-of-custody form, and laboratory certificates-of-analysis for the December 2002 leachate sampling event are presented in Attachment 3.

Landfill Gas Extraction Well Monitoring

On December 18, 2002, JEI personnel collected landfill gas (LFG) measurements of methane, carbon dioxide, oxygen, balance gases, and hydrogen sulfide from 20 LFG extraction wells. In addition, measurements of temperature, flow rate, static vacuum, and differential pressure were recorded. Measurements were recorded using a CES-LandTEC GEM 500 instrument. Hydrogen sulfide measurements were recorded using an Industrial Scientific instrument. Both instruments were calibrated with a known calibration standard before and after use during each event. A table displaying the LFG monitoring results is presented in Attachment 4.

Landfill Gas Sampling

On December 19, 2002, JEI personnel collected samples from the landfill gas collection system. Four 1-liter summa canister samples were collected from the western, central, and eastern header pipe of the landfill gas collection system and from a location downstream of the landfill gas collection system blower. The samples were sent to STL of Los Angeles, California, for analysis of volatile organic compounds by EPA Method TO-15, methane, oxygen, carbon dioxide, nitrogen, and NMOCs by ASTM methods. A chain-of-custody form and laboratory certificates-of-analyses for the December 2002 LFG samples are presented in Attachment 5.

Please feel free to contact me at 804-355-4520 or at mwilliams@joyceengineering.com if you have any questions concerning the XL Program results presented herein.

JOYCE
ENGINEERING, INC

Sincerely,
JOYCE ENGINEERING, INC.

Michael G. Williams, C.P.G.
Senior Project Hydrogeologist

Attachments:
Attachment 1 - SEM Calibration Logs and NSPS SEM Monitoring Data: December 2002
Attachment 2 - SEM Route Drawings
Attachment 3 - Leachate Sampling Chain-of-Custody Forms and Laboratory Certificates-of-Analysis: December 2002
Attachment 4 - Landfill Gas Extraction Well Monitoring Data
Attachment 5 - Landfill Gas Sampling Chain-of-Custody Forms and Laboratory Certificates-of-Analysis: December 2002

C: James Stenborg, P.E., WMI
Howard Burns, WMI
David McMillan, JEI (letter only)

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Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
XL Project
December 19, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
19-Dec-02	10:53:04	1	1.42	OK	
19-Dec-02	10:53:45	2	1.69	OK	
19-Dec-02	10:54:20	3	2.02	OK	
19-Dec-02	10:54:55	4	2.08	OK	
19-Dec-02	10:55:31	5	2.48	OK	
19-Dec-02	10:56:06	6	2.42	OK	
19-Dec-02	10:56:51	7	2.36	OK	
19-Dec-02	10:57:24	8	2.16	OK	
19-Dec-02	10:57:59	9	3.1	OK	
19-Dec-02	10:58:35	10	2.55	OK	
19-Dec-02	10:59:25	11	2.5	OK	
19-Dec-02	11:00:02	12	2.34	OK	
19-Dec-02	11:00:45	13	2.64	OK	
19-Dec-02	11:01:20	14	2.65	OK	
19-Dec-02	11:01:57	15	3.54	OK	
19-Dec-02	11:02:34	16	6.73	OK	
19-Dec-02	11:03:18	17	7.03	OK	
19-Dec-02	11:04:11	18	3.12	OK	
19-Dec-02	11:04:49	19	2.55	OK	
19-Dec-02	11:05:41	20	2.23	OK	
19-Dec-02	11:06:14	21	2.31	OK	
19-Dec-02	11:06:50	22	2.57	OK	
19-Dec-02	11:07:24	23	3.19	OK	
19-Dec-02	11:08:02	24	3.05	OK	
19-Dec-02	11:08:42	25	2.08	OK	
19-Dec-02	11:09:16	26	2.13	OK	
19-Dec-02	11:09:54	27	3.09	OK	
19-Dec-02	11:10:36	28	50.66	OK	
19-Dec-02	11:11:32	29	37.99	OK	
19-Dec-02	11:12:11	30	27.67	OK	
19-Dec-02	11:12:46	31	16.79	OK	
19-Dec-02	11:13:22	32	16.47	OK	
19-Dec-02	11:14:04	33	13.01	OK	
19-Dec-02	11:14:46	34	18.07	OK	
19-Dec-02	11:15:25	35	18.29	OK	
19-Dec-02	11:16:04	36	13.59	OK	
19-Dec-02	11:16:45	37	18.45	OK	
19-Dec-02	11:17:34	38	18.35	OK	
19-Dec-02	11:18:59	39	63.8	OK	
19-Dec-02	11:19:50	40	33.78	OK	
19-Dec-02	11:20:40	41	81.68	OK	
19-Dec-02	11:22:32	42	67.94	OK	
19-Dec-02	11:23:35	43	47.77	OK	
19-Dec-02	11:24:24	44	75.39	OK	
19-Dec-02	11:25:29	45	73.44	OK	
19-Dec-02	11:26:15	46	113	OK	
19-Dec-02	11:27:07	47	169	OK	
19-Dec-02	11:28:40	48	41.21	OK	
19-Dec-02	11:29:33	49	100	OK	
19-Dec-02	11:30:20	50	73.22	OK	
19-Dec-02	11:31:43	51	27.41	OK	

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
XL Project
December 19, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
19-Dec-02	11:32:33	52	47.79	OK	
19-Dec-02	11:33:48	53	83.71	OK	
19-Dec-02	11:34:34	54	68.27	OK	
19-Dec-02	11:35:33	55	39.53	OK	
19-Dec-02	11:36:23	56	53.33	OK	
19-Dec-02	11:37:07	57	53.96	OK	
19-Dec-02	11:38:22	58	294	OK	
19-Dec-02	11:39:23	59	266	OK	
19-Dec-02	11:40:11	60	168	OK	
19-Dec-02	11:41:31	61	167	OK	
19-Dec-02	11:42:21	62	67.52	OK	
19-Dec-02	11:43:11	63	61.25	OK	
19-Dec-02	11:44:02	64	54.03	OK	
19-Dec-02	11:44:49	65	102	OK	
19-Dec-02	11:47:47	66	139	OK	
19-Dec-02	11:49:48	67	70.64	OK	
19-Dec-02	11:50:35	68	57.35	OK	
19-Dec-02	11:51:22	69	101	OK	
19-Dec-02	11:52:03	70	20.98	OK	
19-Dec-02	11:52:46	71	75.87	OK	
19-Dec-02	11:53:48	72	19.51	OK	
19-Dec-02	11:54:38	73	6.9	OK	
19-Dec-02	11:55:23	74	8.22	OK	
19-Dec-02	11:56:08	75	10.7	OK	
19-Dec-02	11:56:52	76	10.67	OK	
19-Dec-02	11:57:59	77	23.2	OK	
19-Dec-02	11:58:50	78	34.23	OK	
19-Dec-02	11:59:41	79	12.04	OK	
19-Dec-02	12:00:25	80	25.27	OK	
19-Dec-02	12:01:08	81	28.8	OK	
19-Dec-02	12:01:55	82	10.21	OK	
19-Dec-02	12:02:43	83	16.34	OK	
19-Dec-02	12:03:26	84	22.63	OK	
19-Dec-02	12:04:15	85	18.76	OK	
19-Dec-02	12:04:56	86	13.52	OK	
19-Dec-02	12:05:36	87	36.5	OK	
19-Dec-02	12:06:19	88	10.16	OK	
19-Dec-02	12:07:01	89	48.23	OK	
19-Dec-02	12:07:42	90	24.43	OK	
19-Dec-02	12:08:23	91	25.96	OK	
19-Dec-02	12:09:04	92	44.95	OK	
19-Dec-02	12:09:53	93	75	OK	
19-Dec-02	12:10:34	94	110	OK	
19-Dec-02	12:11:22	95	167	OK	
19-Dec-02	12:12:20	96	65.63	OK	
19-Dec-02	12:13:09	97	153	OK	
19-Dec-02	12:13:51	98	71.83	OK	
19-Dec-02	12:14:31	99	31.11	OK	
19-Dec-02	12:15:15	100	118	OK	
19-Dec-02	12:15:58	101	23.85	OK	
19-Dec-02	12:16:49	102	62.37	OK	
19-Dec-02	12:17:44	103	75.58	OK	
19-Dec-02	12:18:44	104	54.87	OK	
19-Dec-02	12:19:27	105	50.81	OK	

Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
XL Project
December 19, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
19-Dec-02	12:20:15	106	62.39	OK	
19-Dec-02	12:20:59	107	44.04	OK	
19-Dec-02	12:21:45	108	249	OK	
19-Dec-02	12:22:32	109	15.74	OK	
19-Dec-02	12:23:14	110	8.12	OK	
19-Dec-02	12:23:55	111	16.85	OK	
19-Dec-02	12:24:37	112	29.29	OK	
19-Dec-02	12:25:18	113	18.41	OK	
19-Dec-02	12:26:03	114	32.6	OK	
19-Dec-02	12:26:45	115	15.49	OK	
19-Dec-02	12:27:27	116	23.05	OK	
19-Dec-02	12:28:09	117	17.78	OK	
19-Dec-02	12:28:53	118	29.39	OK	
19-Dec-02	12:29:34	119	37.02	OK	
19-Dec-02	12:30:20	120	17.95	OK	
19-Dec-02	12:31:39	121	27.01	OK	
19-Dec-02	12:32:21	122	15.99	OK	
19-Dec-02	12:33:04	123	22.28	OK	
19-Dec-02	12:33:40	124	44.39	OK	
19-Dec-02	12:34:22	125	33.3	OK	
19-Dec-02	12:35:08	126	18.52	OK	
19-Dec-02	12:35:43	127	33.25	OK	
19-Dec-02	12:38:01	128	13.06	OK	
19-Dec-02	12:38:49	129	11.89	OK	
19-Dec-02	12:39:50	130	15.75	OK	
19-Dec-02	12:40:35	131	12.46	OK	
19-Dec-02	12:41:56	132	15.7	OK	
19-Dec-02	12:43:05	133	9.41	OK	
19-Dec-02	12:44:15	134	10.21	OK	
19-Dec-02	12:44:55	135	11.73	OK	
19-Dec-02	12:45:38	136	22.47	OK	
19-Dec-02	12:46:25	137	39.99	OK	
19-Dec-02	12:47:39	138	60.13	OK	
19-Dec-02	12:51:00	139	6.33	OK	
19-Dec-02	12:54:52	140	29.78	OK	
19-Dec-02	12:55:47	141	15.67	OK	
19-Dec-02	12:56:28	142	8.13	OK	
19-Dec-02	12:57:13	143	33.75	OK	
19-Dec-02	12:57:55	144	59.52	OK	
19-Dec-02	12:58:31	145	17.46	OK	
19-Dec-02	12:59:20	146	23.28	OK	
19-Dec-02	13:00:01	147	23.41	OK	
19-Dec-02	13:00:44	148	15.98	OK	
19-Dec-02	13:01:29	149	65.58	OK	
19-Dec-02	13:02:18	150	75.41	OK	
19-Dec-02	13:03:27	151	16.74	OK	
19-Dec-02	13:04:27	152	14.2	OK	
19-Dec-02	13:05:11	153	28.56	OK	
19-Dec-02	13:05:54	154	21.66	OK	
19-Dec-02	13:06:47	155	9.51	OK	
19-Dec-02	13:07:33	156	67.49	OK	
19-Dec-02	13:08:29	157	22.26	OK	
19-Dec-02	13:09:16	158	31.42	OK	
19-Dec-02	13:10:00	159	21.24	OK	
19-Dec-02	13:10:42	160	30.39	OK	

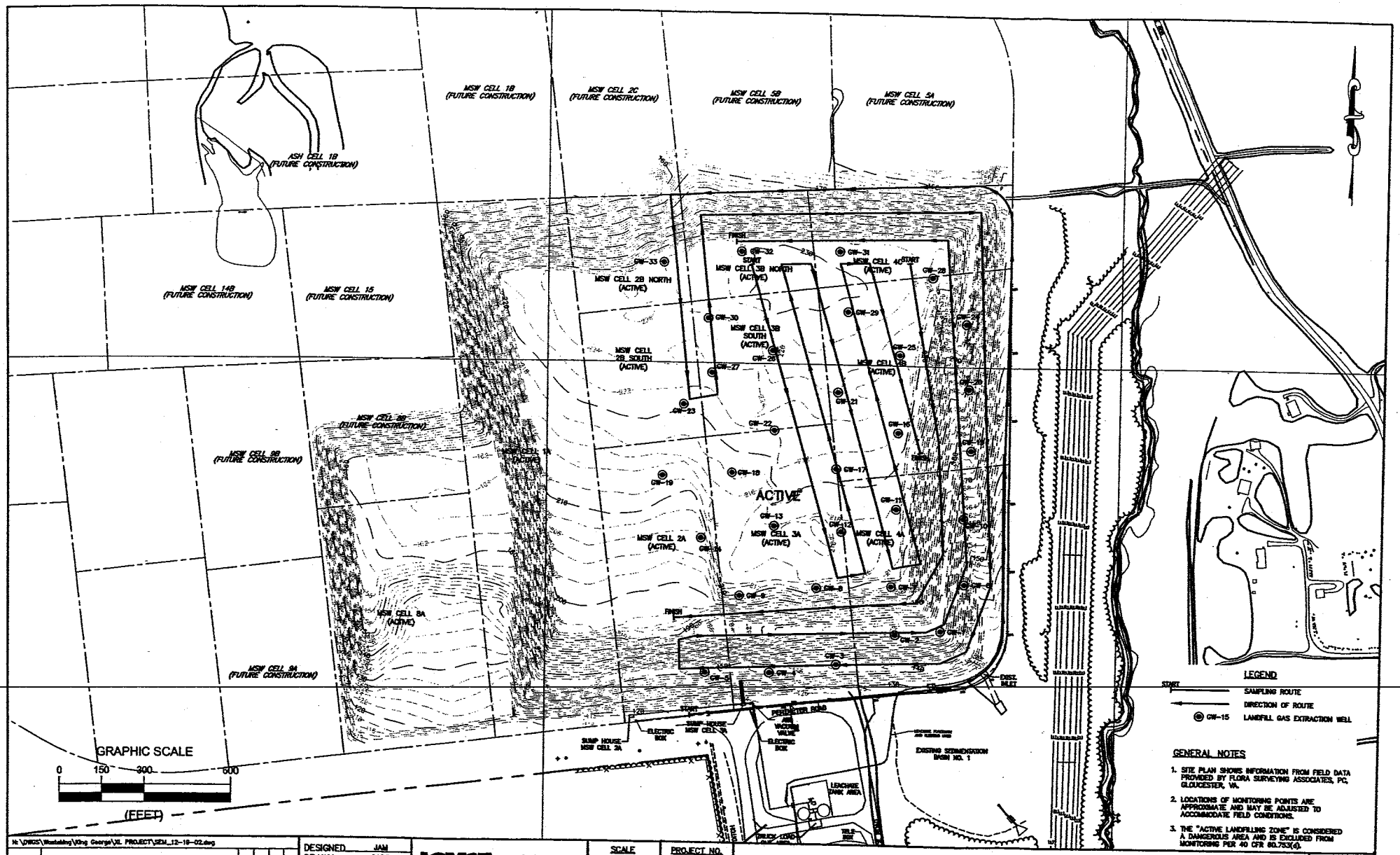
Waste Management, Inc.
New King George County Landfill
NSPS Surface Emission Monitoring Data
XL Project
December 19, 2002

Date	Time	Tag #	Conc. Methane (ppm)	Pass/Fail	Notes
19-Dec-02	13:11:23	161	10.19	OK	
19-Dec-02	13:12:24	162	16.86	OK	
19-Dec-02	13:13:04	163	21.43	OK	
19-Dec-02	13:13:45	164	11.96	OK	
19-Dec-02	13:14:38	165	16.09	OK	
19-Dec-02	13:15:46	166	67.91	OK	
19-Dec-02	13:16:33	167	24.05	OK	
19-Dec-02	13:17:43	168	60.82	OK	
19-Dec-02	13:18:21	169	11.41	OK	
19-Dec-02	13:18:57	170	35.86	OK	
19-Dec-02	13:19:57	171	12.38	OK	
19-Dec-02	13:20:33	172	26.35	OK	
19-Dec-02	13:21:17	173	65.42	OK	
19-Dec-02	13:22:26	174	14.1	OK	
19-Dec-02	13:23:09	175	9.64	OK	
19-Dec-02	13:23:55	176	6.44	OK	
19-Dec-02	13:24:38	177	19.73	OK	
19-Dec-02	13:26:02	178	14.98	OK	
19-Dec-02	13:26:46	179	9.58	OK	
19-Dec-02	13:27:33	180	34.36	OK	
19-Dec-02	13:28:28	181	27.01	OK	
19-Dec-02	13:29:13	182	33.64	OK	
19-Dec-02	13:33:04	183	16.81	OK	
19-Dec-02	13:33:53	184	13.89	OK	
19-Dec-02	13:34:35	185	24.75	OK	
19-Dec-02	13:35:15	186	39.17	OK	
19-Dec-02	13:35:54	187	32.5	OK	
19-Dec-02	13:36:43	188	26.73	OK	
19-Dec-02	13:37:25	189	85.83	OK	
19-Dec-02	13:38:06	190	17.69	OK	
19-Dec-02	13:38:47	191	28.2	OK	
19-Dec-02	13:39:24	192	24.47	OK	
19-Dec-02	13:40:07	193	24.29	OK	
19-Dec-02	13:40:56	194	40.66	OK	
19-Dec-02	13:41:37	195	107	OK	
19-Dec-02	13:42:20	196	25.16	OK	
19-Dec-02	13:43:06	197	17.02	OK	
19-Dec-02	13:43:51	198	13.67	OK	
19-Dec-02	13:44:35	199	26.58	OK	
19-Dec-02	13:45:21	200	57.65	OK	
19-Dec-02	13:46:03	201	24.92	OK	
19-Dec-02	13:46:59	202	34.25	OK	
19-Dec-02	13:47:42	203	68.4	OK	
19-Dec-02	13:48:27	204	72.16	OK	

No. of points monitored: 204 Background Upwind: 1.71 ppm
No. of exceedance points: 0 Background Downwind: 22.23 ppm

NOTES:
Weather: Overcast, highs in the low to mid 50s.
Barometric pressure average 30.09 inches of mercury

Instrument: Foxboro TVA-1000B; ID Number 18787439



GENERAL NOTES

1. SITE PLAN SHOWS INFORMATION FROM FIELD DATA PROVIDED BY FLORA SURVEYING ASSOCIATES, PC, GLOUCESTER, VA.
2. LOCATIONS OF MONITORING POINTS ARE APPROXIMATE AND MAY BE ADJUSTED TO ACCOMMODATE FIELD CONDITIONS.
3. THE "ACTIVE LANDFILLING ZONE" IS CONSIDERED A DANGEROUS AREA AND IS EXCLUDED FROM MONITORING PER 40 CFR 60.753(d).

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DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED JAM
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APPROVED
DATE 12/23/02

JOYCE ENGINEERING, INC.
4809 RADFORD AVENUE
RICHMOND, VA 23230-3308
PHONE: (804) 355-4520
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SCALE: 1"=300'

PROJECT NO.: 464.19

WASTE MANAGEMENT, INC. – KING GEORGE COUNTY LANDFILL
KING GEORGE, VIRGINIA
XL PROJECT – SURFACE EMISSIONS MONITORING PLAN – 12/19/02

DRAWING NO. 1