Environmental Contractors

3809 South 2nd Street
Suite C-400
Austin, TX 78704

512 440-1888
800 339-3034
FAX 512 440-8393
http://www.scsfieldservices.com

SCS FIELD SERVICES

May 2, 2001
File No. 07197026.00

Mr. Harlan Kuehling, P.G.
Wisconsin Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg, WI 53711-5397

Subject: Final 2000 Annual Report of Operations for the Refuse Hideaway Landfill

Dear Hank:

Enclosed, please find our completed annual report for Refuse Hideaway Landfill. I have incorporated your comments and suggested changes based on your review of the draft version of this document.

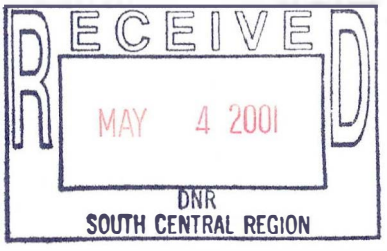
Thank you again for the opportunity to work with you on this site. If you have any questions, please contact me at (800) 339-3034.

Sincerely,

William O. Reed
Regional Manager
SCS FIELD SERVICES, INC.

2000 ANNUAL OPERATION REPORT FOR THE LANDFILL GAS AND LEACHATE COLLECTION SYSTEM REFUSE HIDEAWAY LANDFILL MIDDLETON, WISCONSIN

Prepared for:
Wisconsin Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg, Wisconsin 53711-5397



Prepared by:
SCS Field Services, Inc.
3809 South 2nd Street
Suite C-400
Austin, Texas 78704

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CONTENTS

I. INTRODUCTION

SCS Field Services, Inc. (SCS-FS) is the current operator of the landfill gas (LFG) and leachate collection systems at the Refuse Hideaway Landfill (Site), in Middleton, Wisconsin. This report is prepared to summarize the system operations during the calendar year 2000. This report will highlight the data collected during 2000, and will show trending data that will be used to formulate operational goals for the upcoming years.

II. SITE BACKGROUND

The Site was an active landfill between 1974 and 1988. . The current LFG and leachate collection systems were installed in 1991. The LFG collection system was modified in 1994 with the installation of a shallow gas recovery system, and the leachate collection system was modified in 1996 with the installation of down-hole pneumatic pumps in eight of the vertical wells.

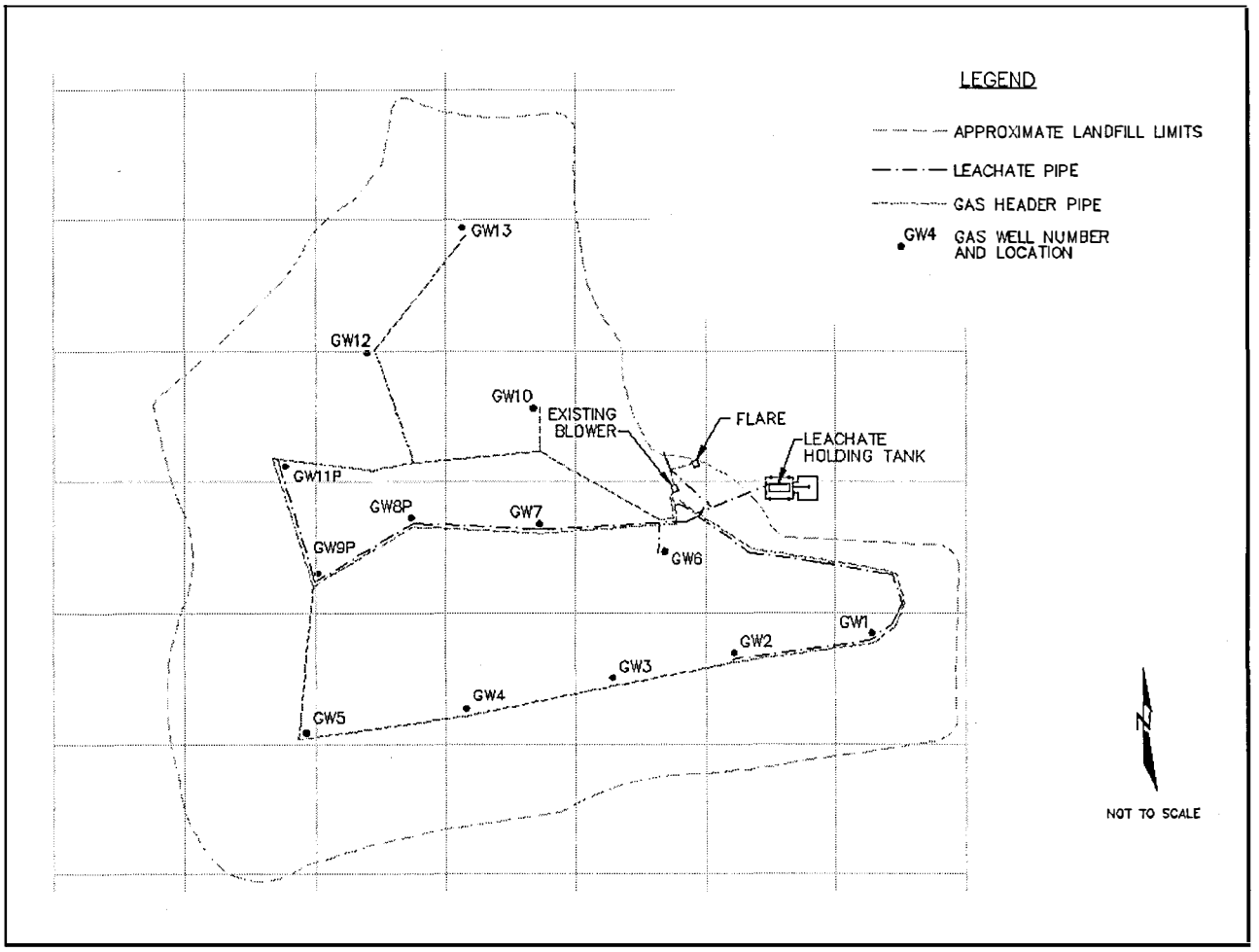
LFG and leachate is collected primarily to prevent and/or minimize off-site migration of contaminants. Given this, it is desirous to operate both collection systems continuously (greater than 90 percent runtime), and to maintain "moderate" LFG quality (methane greater than 40 percent, oxygen less than 1 percent, and balance gases less than 20 percent).

Currently, the LFG collection system consists of 13 vertical LFG collection wells (8 of which are dual LFG and leachate extraction wells), 4 condensate drip legs, and associated below-grade gas and pneumatic header piping. Figure 2-1 shows the approximate layout of the LFG collection system.

The LFG is collected using a 10-horsepower New York® blower, and combusted in a 650 cubic feet per minute (cfm) Linklater® enclosed flare. Proper operation of the LFG collection system is verified through testing of the extraction wells, with adjustments made to the LFG flows based on that testing.

The overall effectiveness of the LFG collection system is determined, in part, through the routine monitoring of 11 methane monitoring probes located on the perimeter of the site. Ambient air monitoring is also performed in the onsite buildings occupied by Speedway Sand and Gravel.

Figure 2-1. Site Layout



III. LFG SYSTEM OPERATIONS

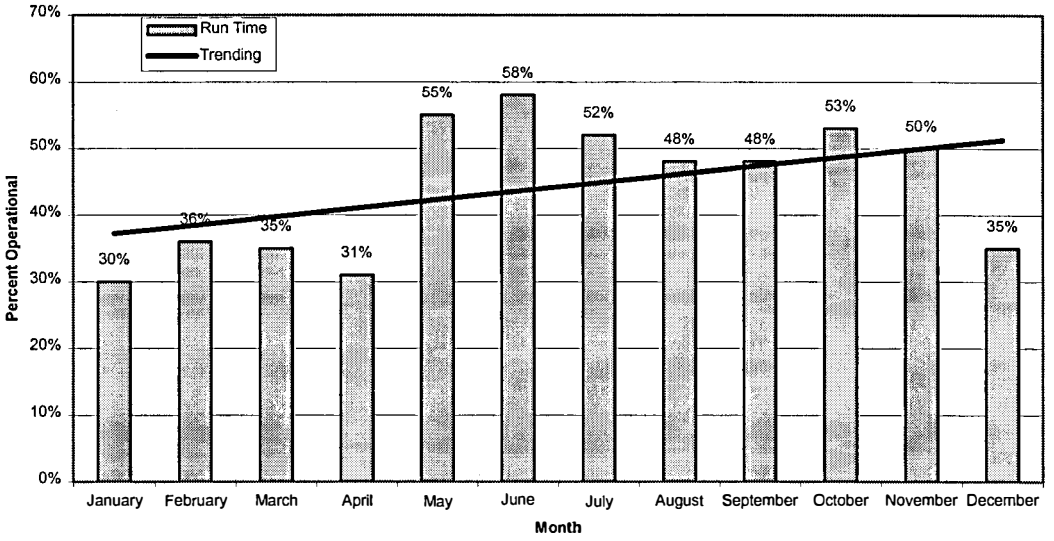
A. Blower/Flare Station

The blower/flare station (BFS) was operational throughout 2000, however the overall system runtime was poor (44 percent for the year), as compared to the system's operational goals. SCS-FS and our subcontractor (Environmental Sampling Corporation – Muskego, Wisconsin) were continuously working to improve the runtime of the BFS. Our primary focus during 2000 was on instrumentation issues related to the flare; however late in 2000 our attention turned more toward mechanical issues associated with the flare. This work continues into 2001.

The monthly runtimes are shown below in figure 3-1. As can be seen, the trending data throughout the year indicates improving runtimes. The highest runtime was achieved in June 2000, where the BFS was operational for 58 percent of the month. The worst runtime was in January 2000, where the BFS was operational for 30 percent of the time. Again, SCS-FS and

Environmental Sampling Corporation (ESC) continue to work toward improving the BFS runtime.

Figure 3-1
Refuse Hideaway 2000
Average Monthly Runtime



Throughout 2000, the average methane and carbon dioxide quality remained relatively consistent. Historically, an LFG control system such as the LFG system at the Site should operate with methane greater than 40 percent, by volume. The carbon dioxide should remain relatively constant, and stay greater than 30 percent. A summary of the weekly BFS LFG quality readings is shown in Figure 3-2.

The oxygen level in the LFG is required to remain below 1 percent, by volume. As the overall LFG generation within the Site decreases, this is becoming increasingly more difficult. As shown in Figure 3-3, the average monthly oxygen level at the BFS exceeded 1 percent during three months of 2000: January, May, and December. A linear trendline indicates that oxygen may be trending higher. This is an issue that may require attention during 2001 and beyond.

A potentially more indicative parameter may be examining the balance gas to oxygen ratio. Balance gas as measured in LFG is primarily considered to be nitrogen, and is most often linked to air intrusion into the waste mass. In ambient air, the ratio of nitrogen to oxygen is approximately 4 to 1. When this ratio is plotted in LFG, higher balance gas to oxygen ratios may indicate excessive collection of the LFG, or potential leaks in the Site cap. Excessive balance gas levels may indicate that air (oxygen and nitrogen) is being drawn into the waste mass, with the oxygen being utilized in an aerobic manner. The effect of this could ultimately reduce the amount of methane generated and collected, as oxygen halts the anaerobic process.

Throughout 2000, the ratio of balance gas to oxygen was higher than in ambient air. This is not uncommon in older, closed sites, however the trending of the data indicates that this ratio was improving, showing less nitrogen in the LFG. This indicates that leaks were repaired, and/or that better wellfield tuning was being performed.

Figure 3-2
Refuse Hideaway 2000
Average Monthly LFG Quality

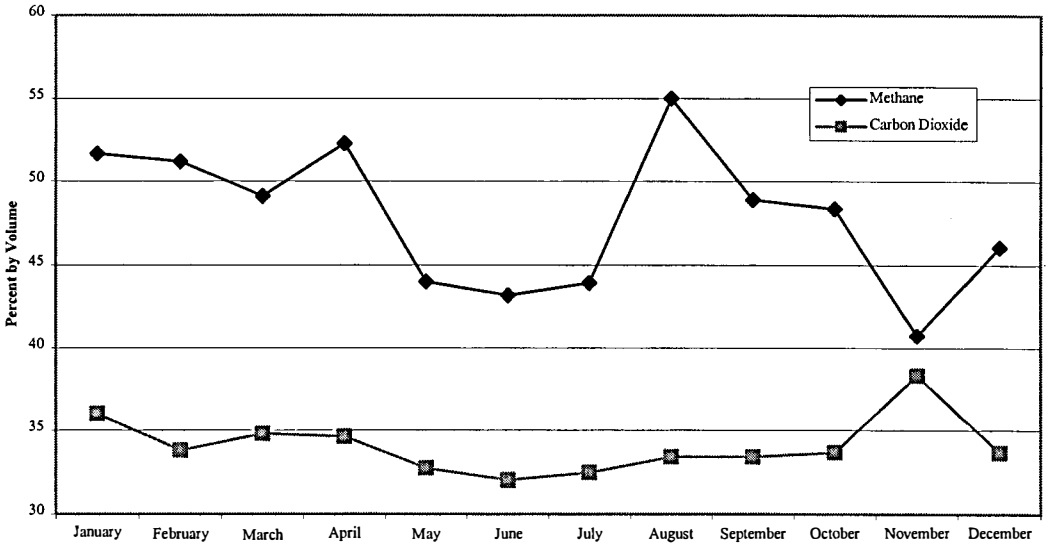


Figure 3-3
Refuse Hideaway 2000
Average Monthly LFG Quality

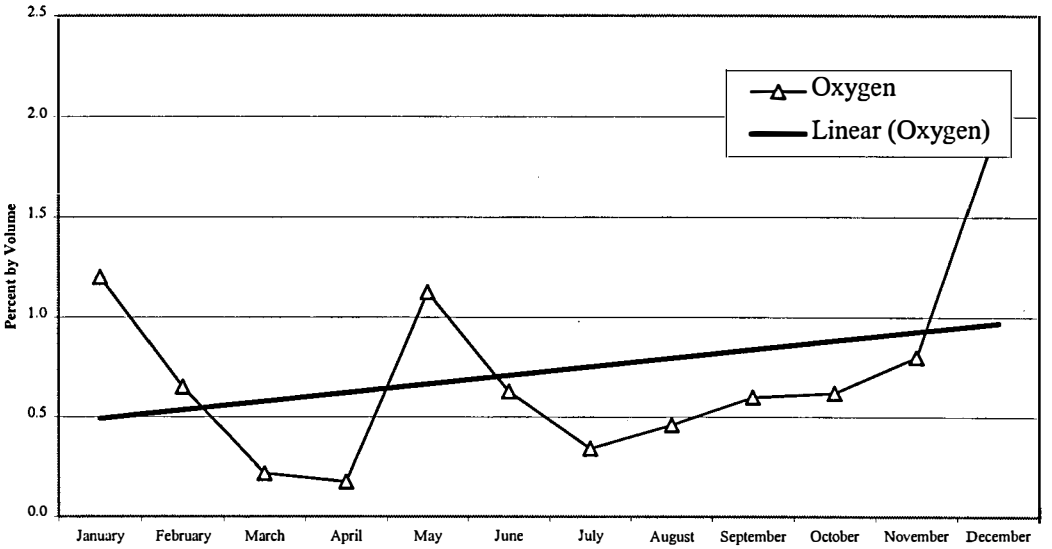
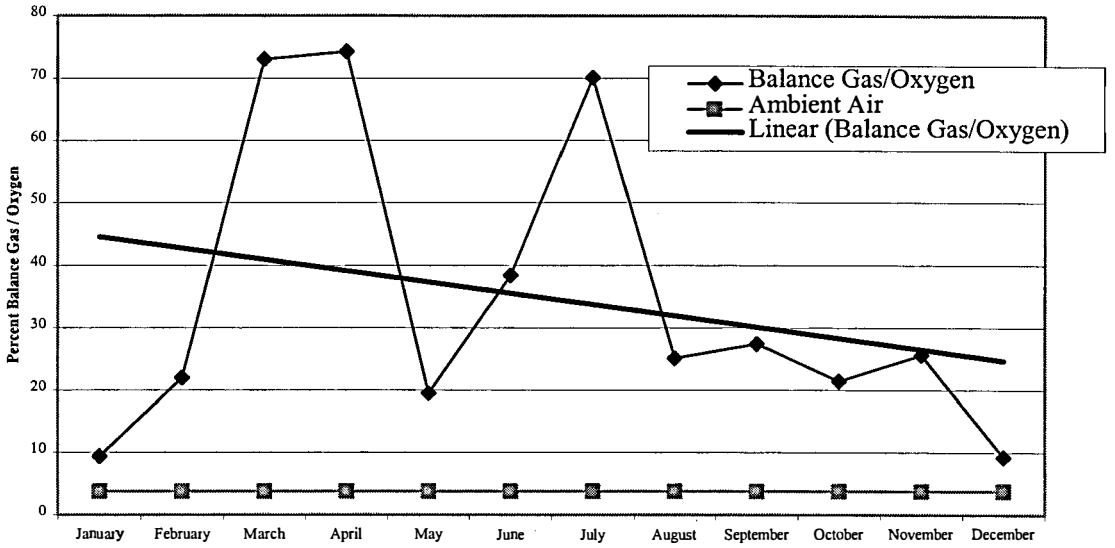


Figure 3-4
Refuse Hideaway 2000
Average Monthly LFG Quality



In early 2001, SCS-FS determined that additional mechanical issues associated with the flare might be responsible for both the reduced runtime, and the higher balance gas to oxygen ratio found in the LFG. Most notably, the electrically operated flare inlet valve was noticed to remain open, when the flare was shut down. The date when this valve became inoperable is not known, but the failure of the valve to close could allow ambient air to be drawn back into the landfill, therefore reducing LFG quality. In 2001 several mechanical issues will be addressed, with one or more of the following options likely:

1. Modify the flare pilot to operate continuously.
2. Install a timer device to operate the flare for adjustable periods of time.
3. Modify the flare to operate at reduced flow levels.
4. Repair or replace the flare inlet valve.

B. LFG Collection Wellfield

The wellfield was maintained in good operational condition throughout 2000. No major problems were noted with the wells or the wellheads. A low spot between GW-4 and GW-5 was repaired by SCS-FS in July 2000. No other operational issues related to the physical condition of the wellfield required attention in 2000.

Monthly wellfield readings were conducted throughout the year, with flow adjustments made to the wells, as needed. Graphical summaries of each well's monthly readings are shown below, in Figures 3-5 through 3-17.

Figure 3-5
GW-1 Gas Quality

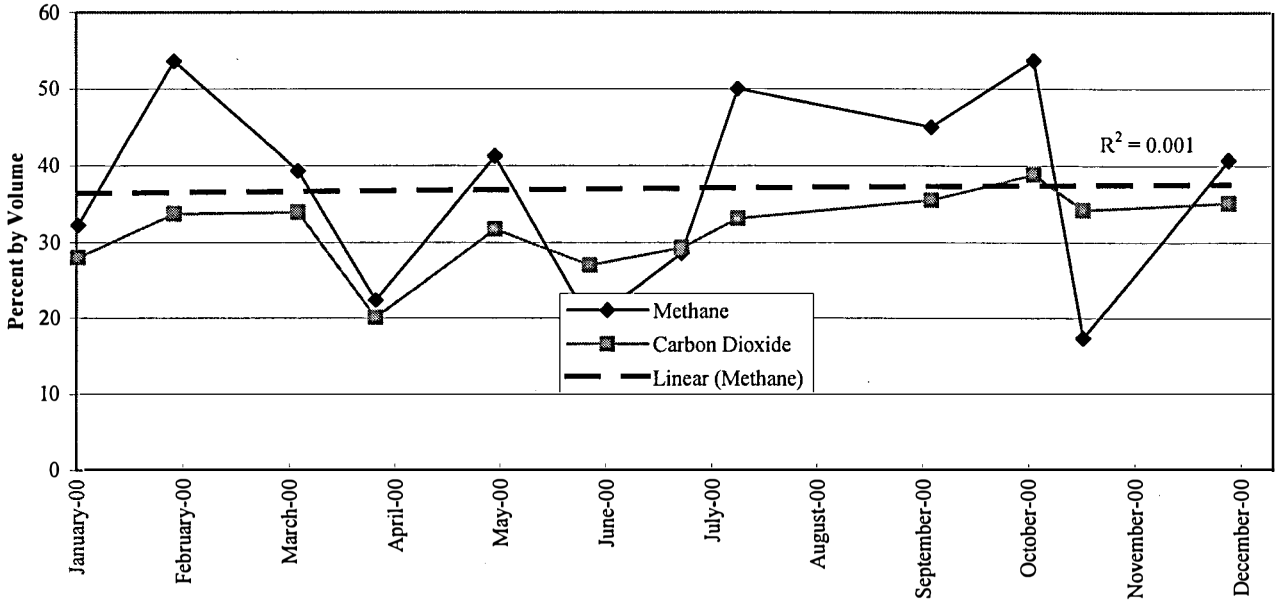


Figure 3-6
GW-2 Gas Quality

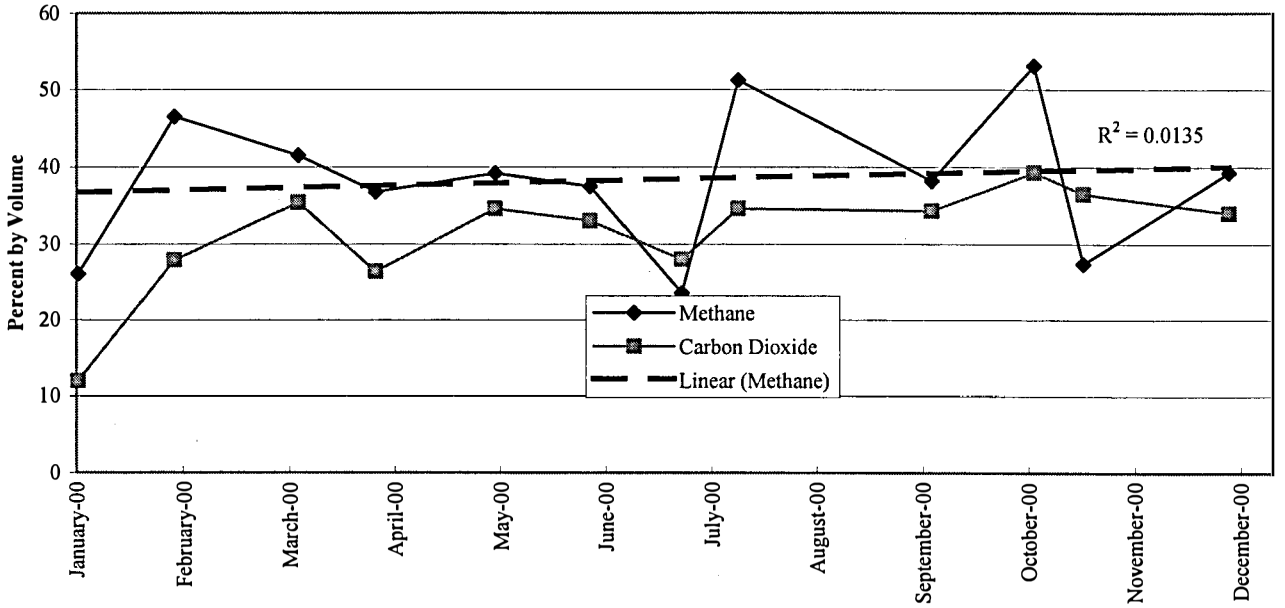


Figure 3-7
GW-3 Gas Quality

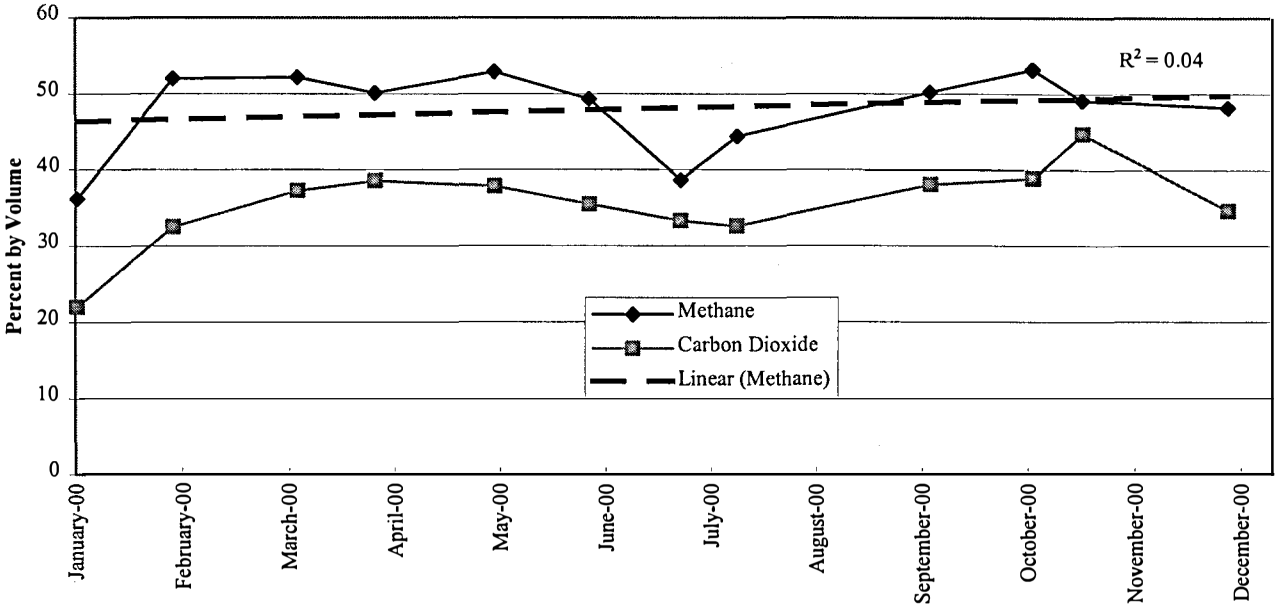


Figure 3-8
GW-4 Gas Quality

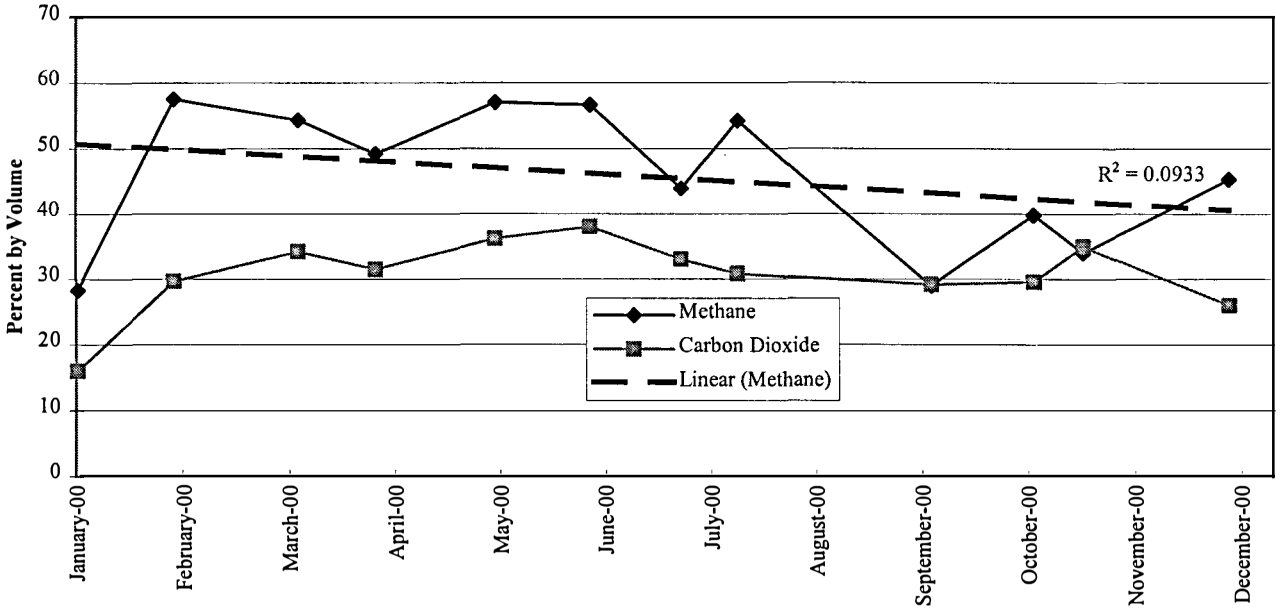


Figure 3-9
GW-5 Gas Quality

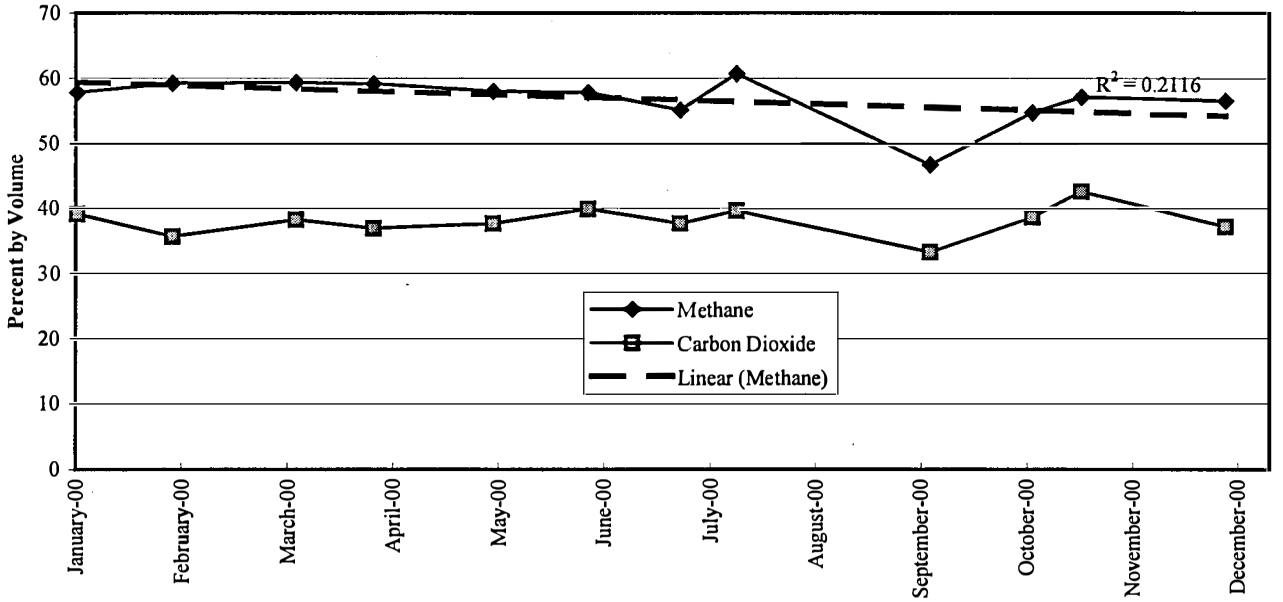


Figure 3-10
GW-6 Gas Quality

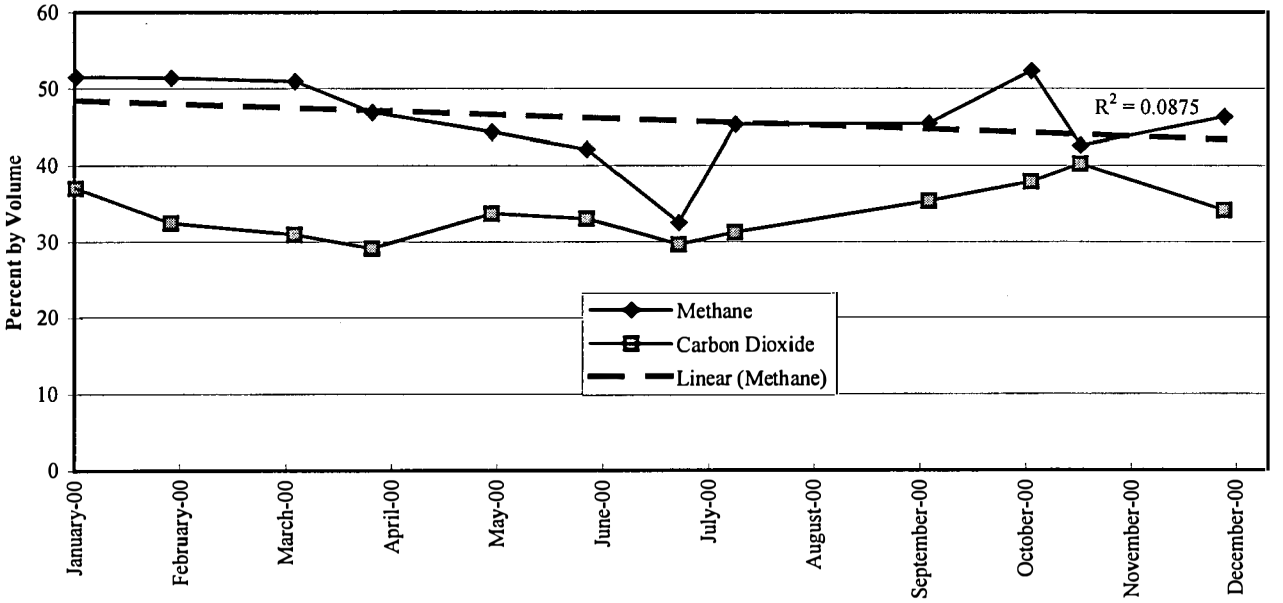


Figure 3-11
GW-7 Gas Quality

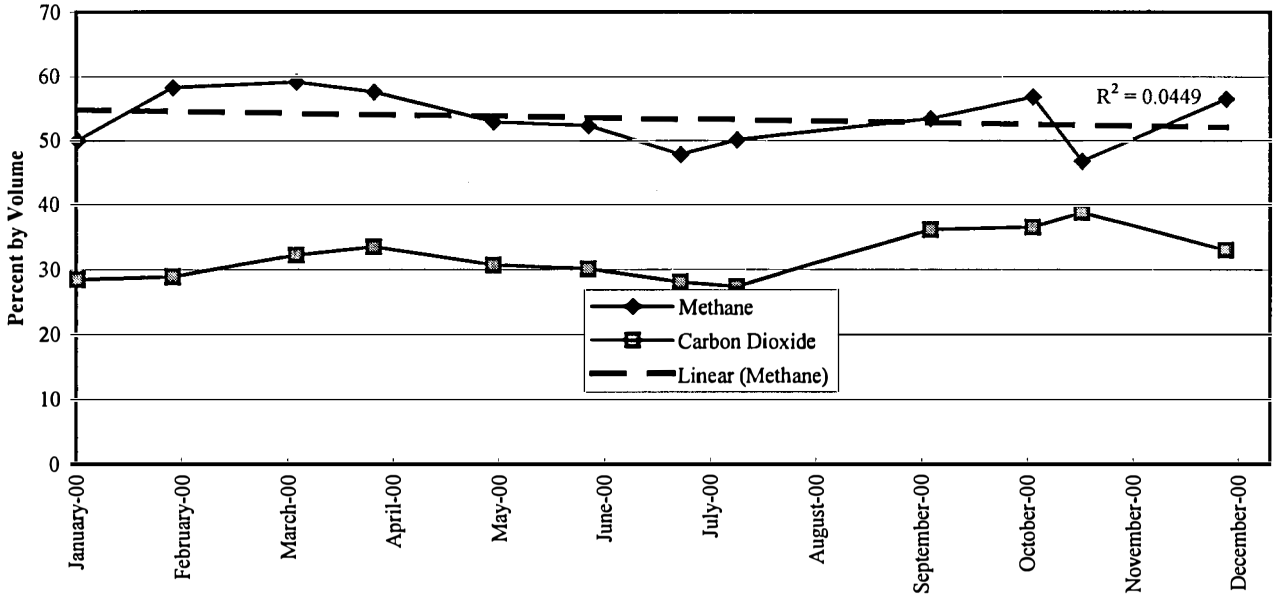


Figure 3-12
GW-8 Gas Quality

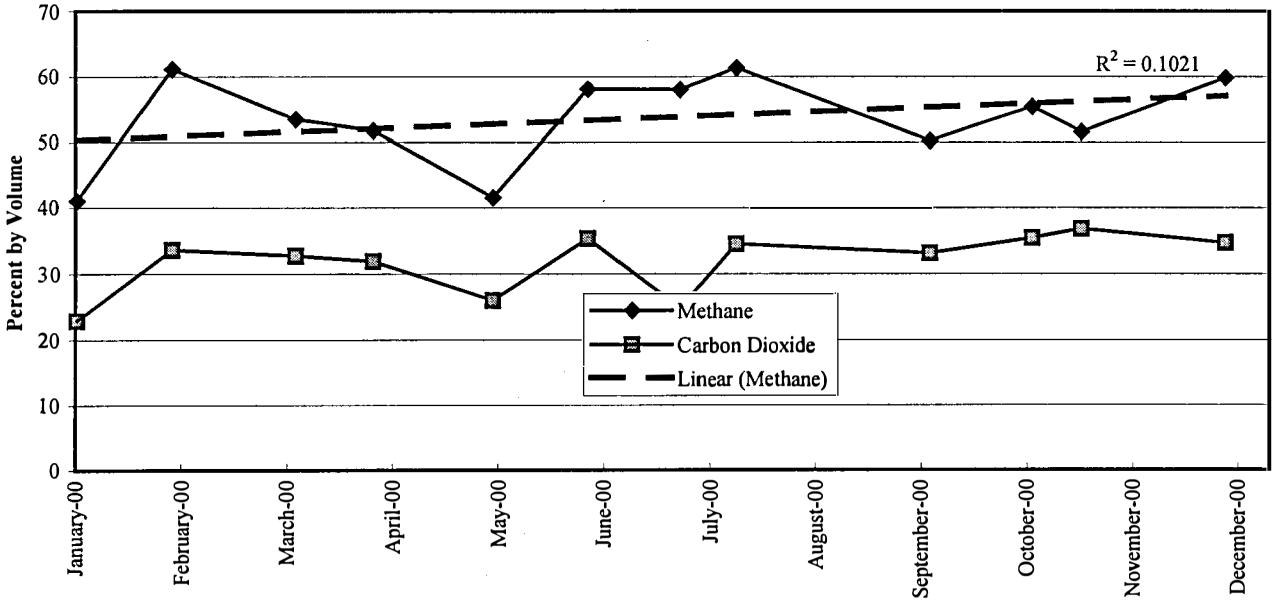


Figure 3-13
GW-9 Gas Quality

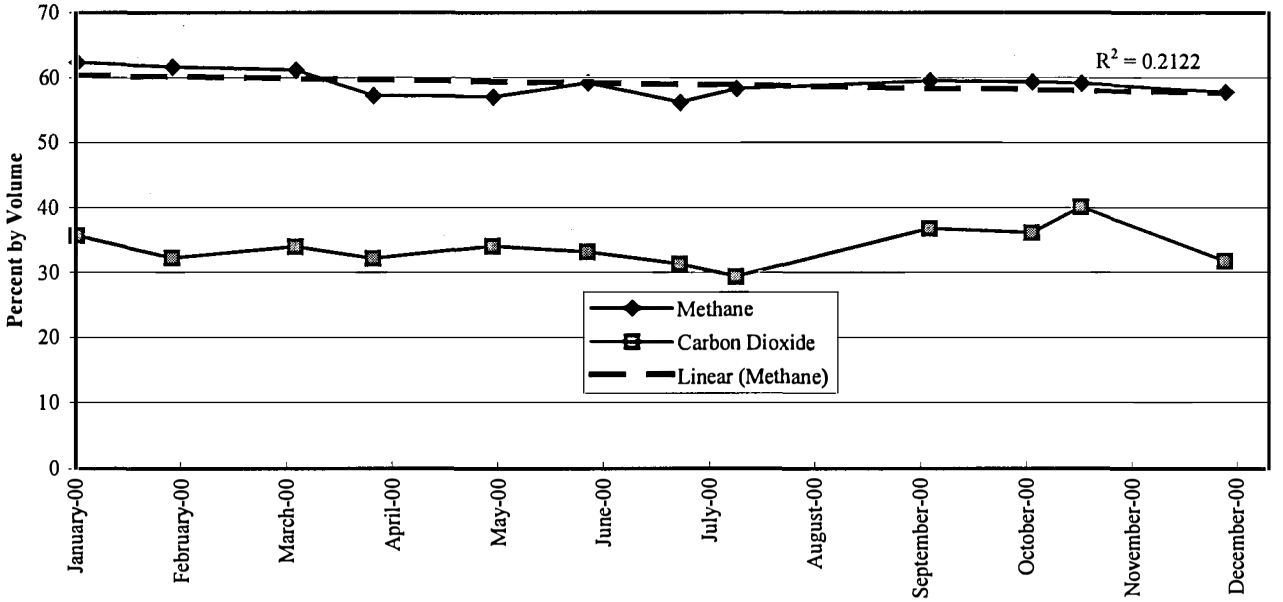


Figure 3-14
GW-10 Gas Quality

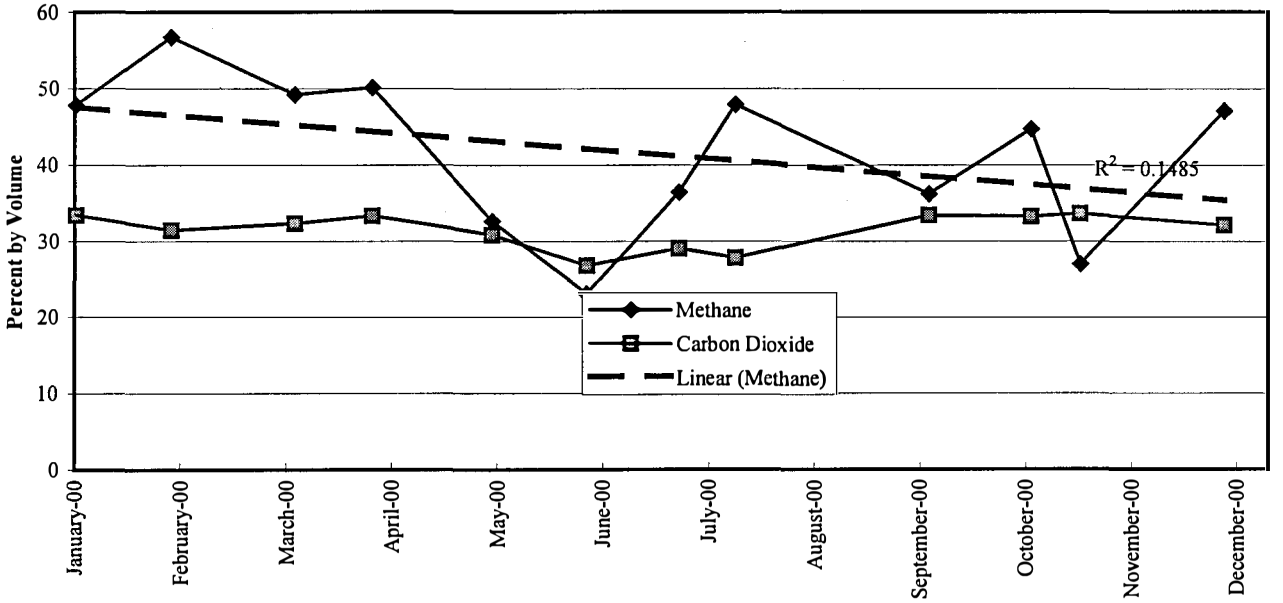


Figure 3-15
GW-11 Gas Quality

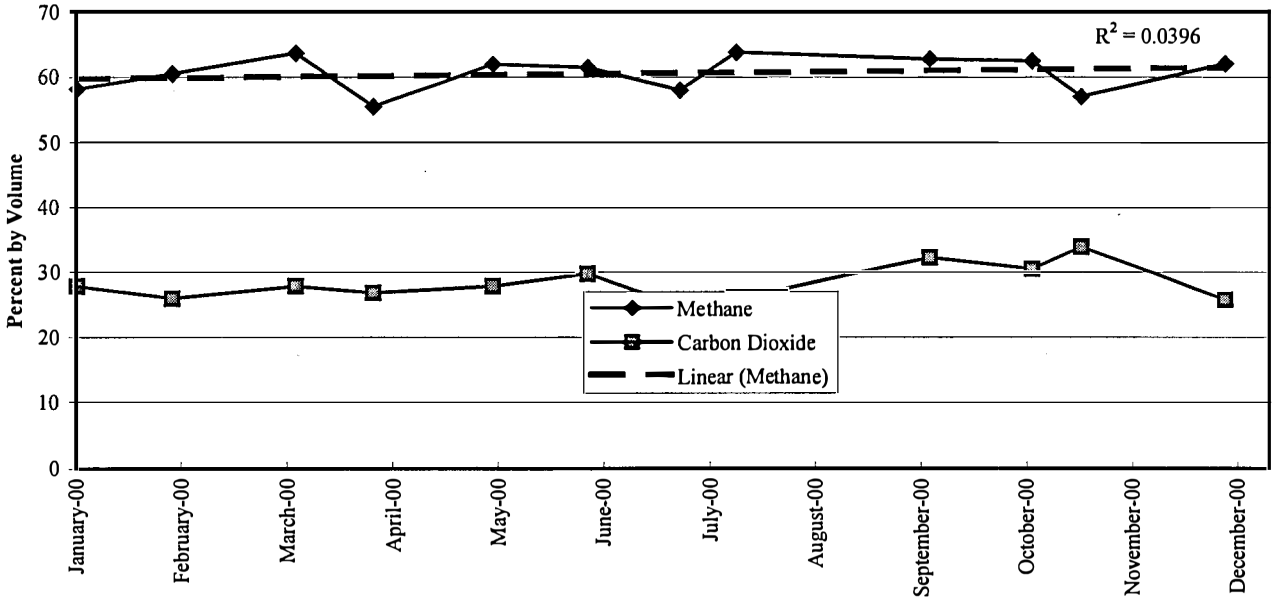


Figure 3-16
GW-12 Gas Quality

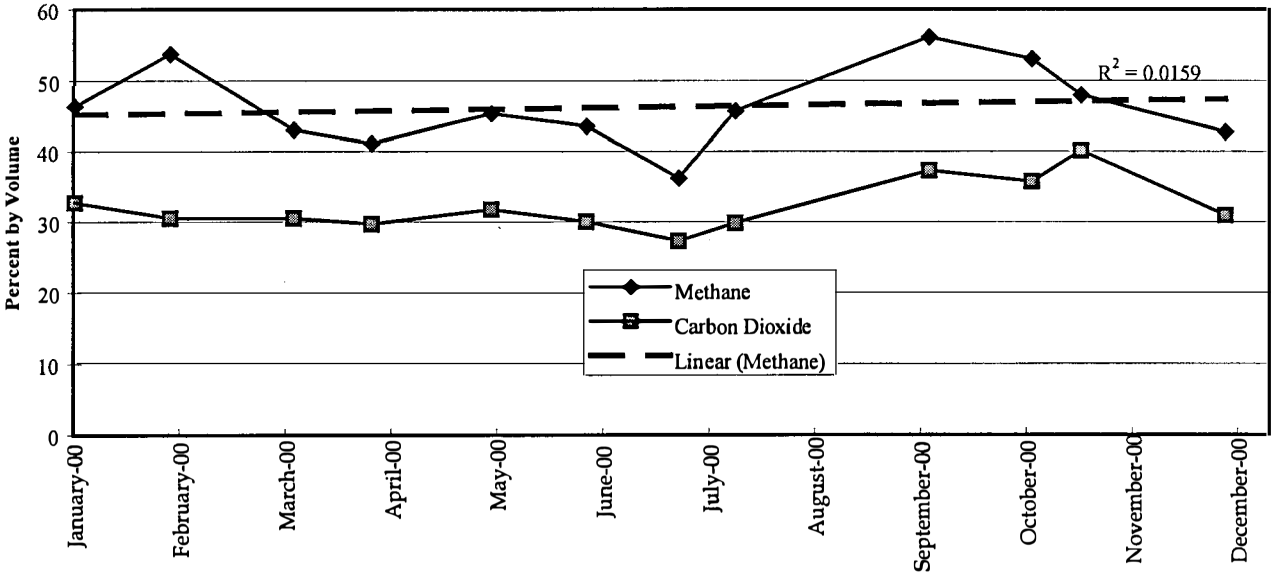
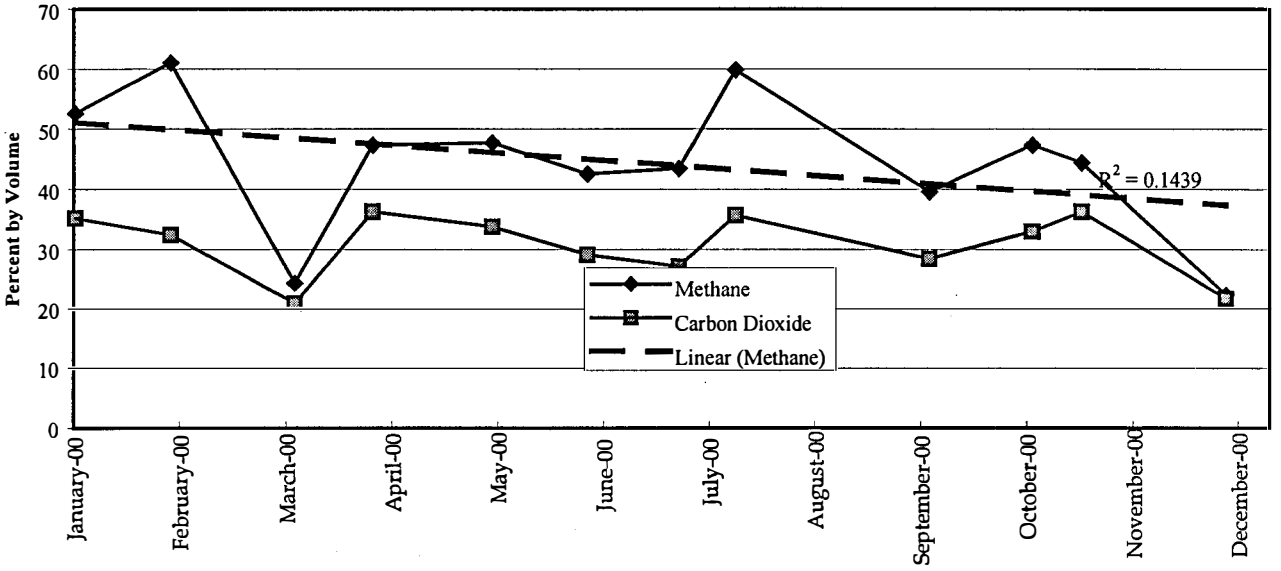


Figure 3-17
GW-13 Gas Quality



As the above figures indicate, the LFG quality remained relatively constant throughout the year. There is some slight indication that LFG quality is degrading in GW-10 and GW-13, however there appears to be no significant trend. This will need to be observed over the next year to confirm. As with each well, adjustments are made on a monthly basis, and are based on LFG quality readings taken that month. Conditions in the field can, and do vary from month to month.

C. Methane Monitoring Probe Results

As stated earlier in this report, there are a total of 11 methane monitoring probes located surrounding the Site. Each of these probes is monitored on a monthly basis. No methane was detected in any of the probes during the monthly events performed in 2000.

Monthly methane monitoring is also performed within the Speedway Sand and Gravel buildings adjacent to the Site. No methane was detected in any of the buildings during 2000.

IV. LEACHATE COLLECTION SYSTEM

A. Summary of 2000 Operation

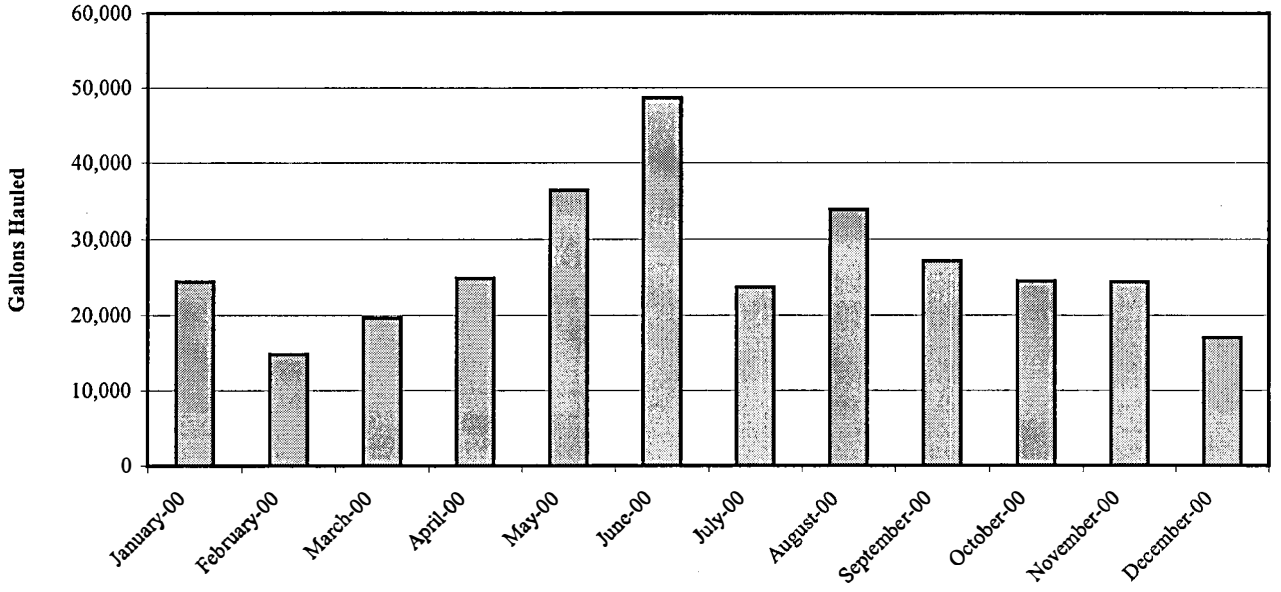
The leachate collected within the landfill is held in a 25,000-gallon below-grade storage tank. A-1 Sanitary Sewer Service (Madison, Wisconsin) pumps the tank on a regular basis, with the leachate being trucked to a Madison Metropolitan Sewerage District POTW for treatment and discharge.

There were only minor problems associated with the leachate collection system in 2000, most notably being with repairs made to the air compressor, none of which should be considered out of the ordinary. A summary of the leachate collection system repairs is shown below:

- February 2000 - Repair a loose wire on the control panel and a stuck oil level float switch in the air compressor.
- October 2000 – Change air compressor solenoid, valve assembly, o-ring, gasket and pressure switch.

In 2000, 66 loads of leachate totaling approximately 319,000 gallons were collected and transported. Figure 4-1 shows the monthly volumes transported.

Figure 4-1
Leachate Volumes Hauled



B. Collection Wells

The leachate level in each collection well is measured once per month. Collection wells GW-4, GW-5, GW-7, GW-8, GW-9, GW-11, GW-12, and GW-13 have dedicated Solo pneumatic pumps in them. The wells with pumps also have "cycle counters" which are recorded on a monthly basis, and compared to the previous months reading to confirm pump operation. Each well's monthly leachate level, and pump activity (if applicable) are indicated below in Figures 4-2 through 4-14.

Figure 4-2
GW-1 Monthly Leachate Levels

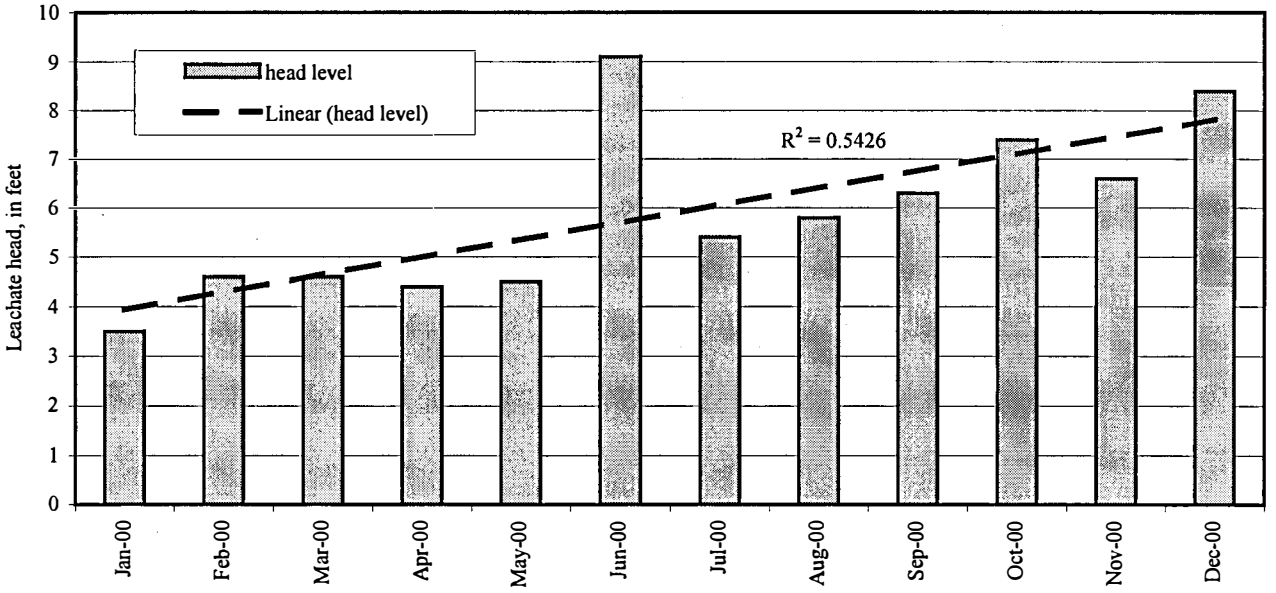


Figure 4-3
GW-2 Monthly Leachate Levels

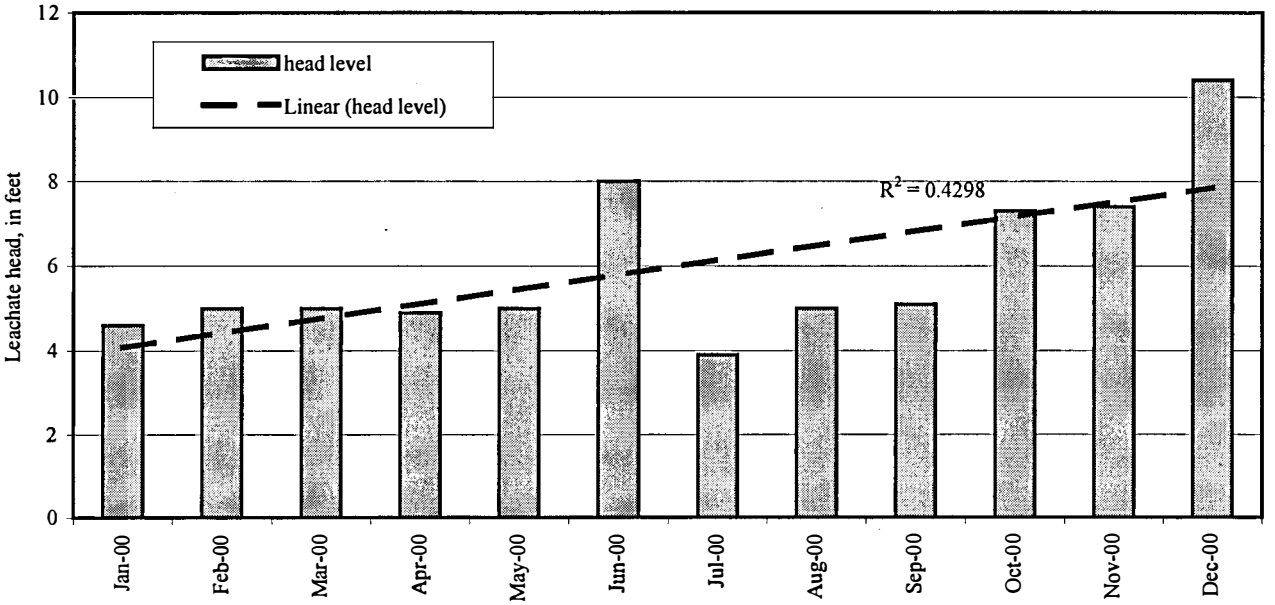


Figure 4-4
GW-3 Monthly Leachate Levels

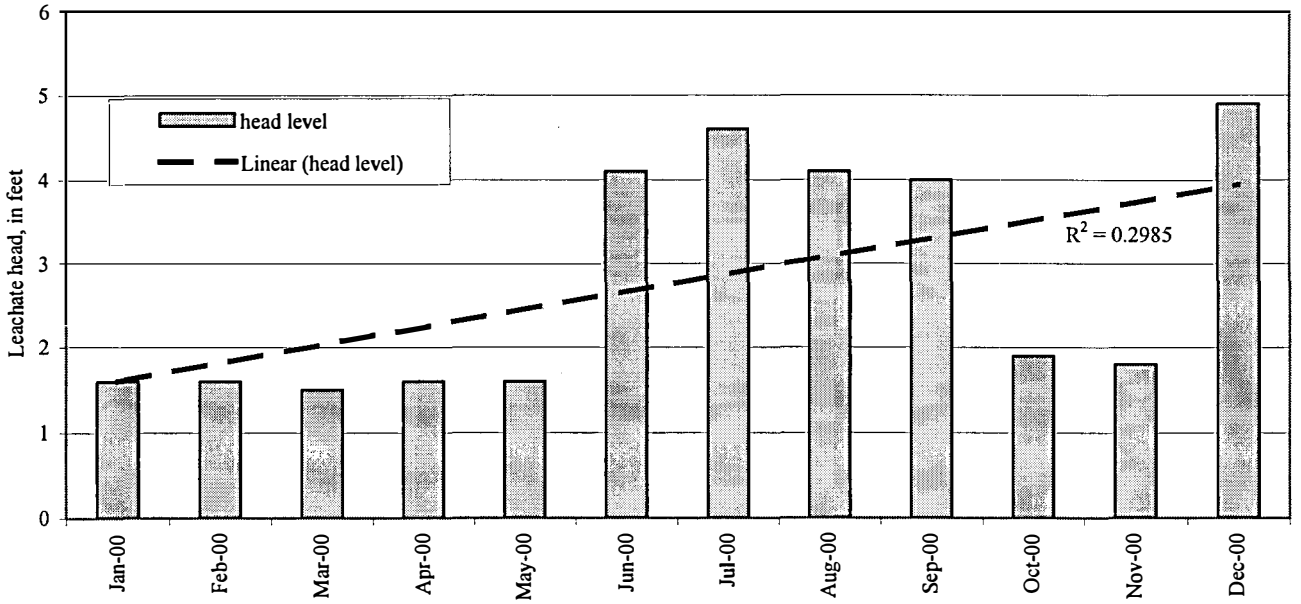


Figure 4-5
GW-4 Monthly Leachate Levels and Pumping

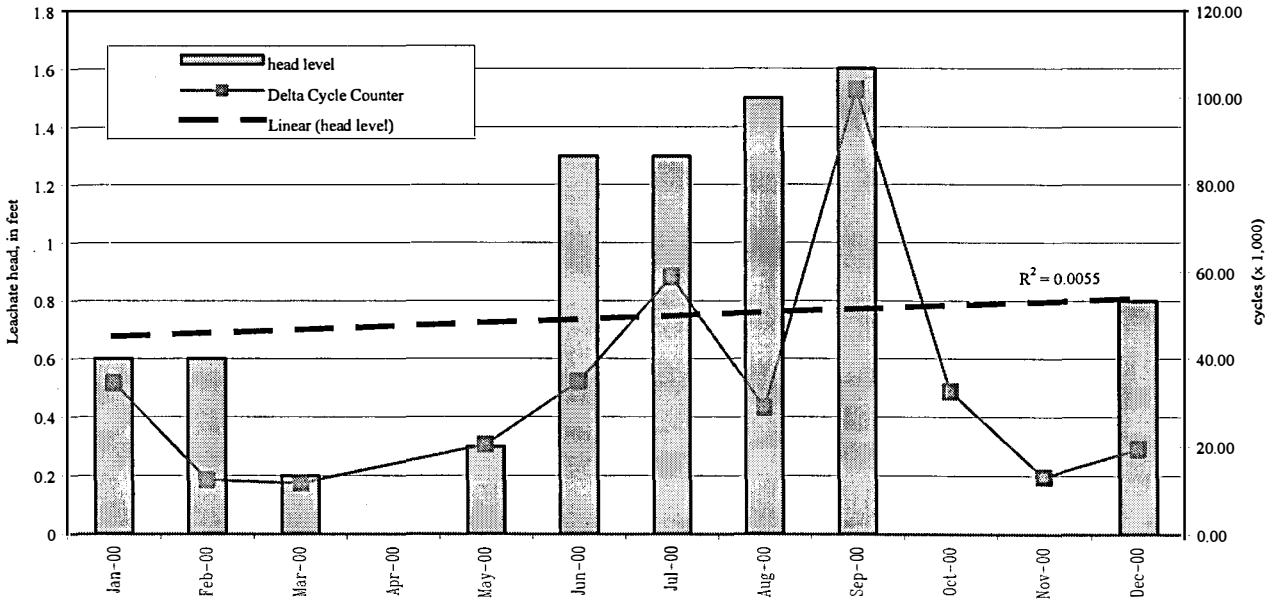


Figure 4-6
GW-5 Monthly Leachate Levels and Pumping

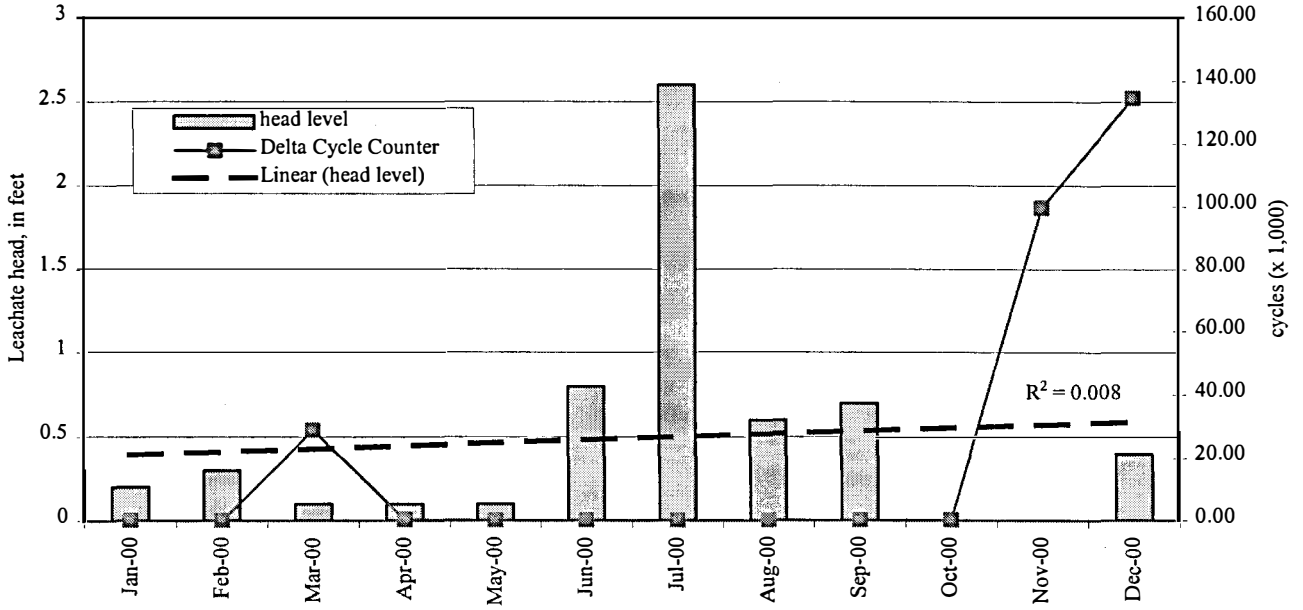


Figure 4-7
GW-6 Monthly Leachate Levels

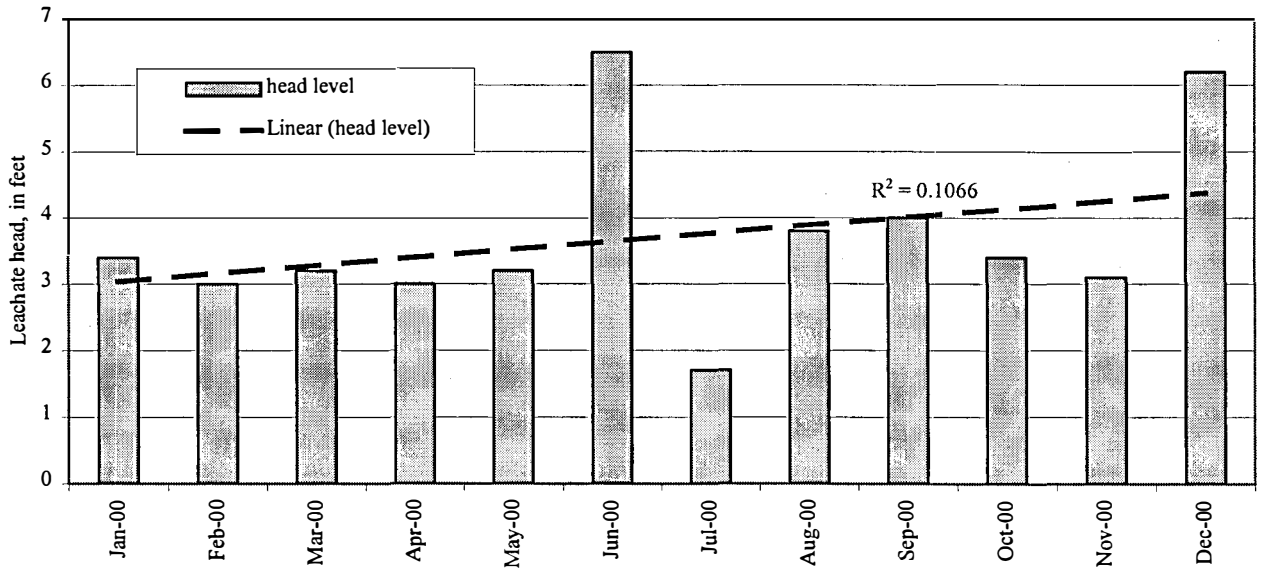


Figure 4-8
GW-7 Monthly Leachate Levels and Pumping

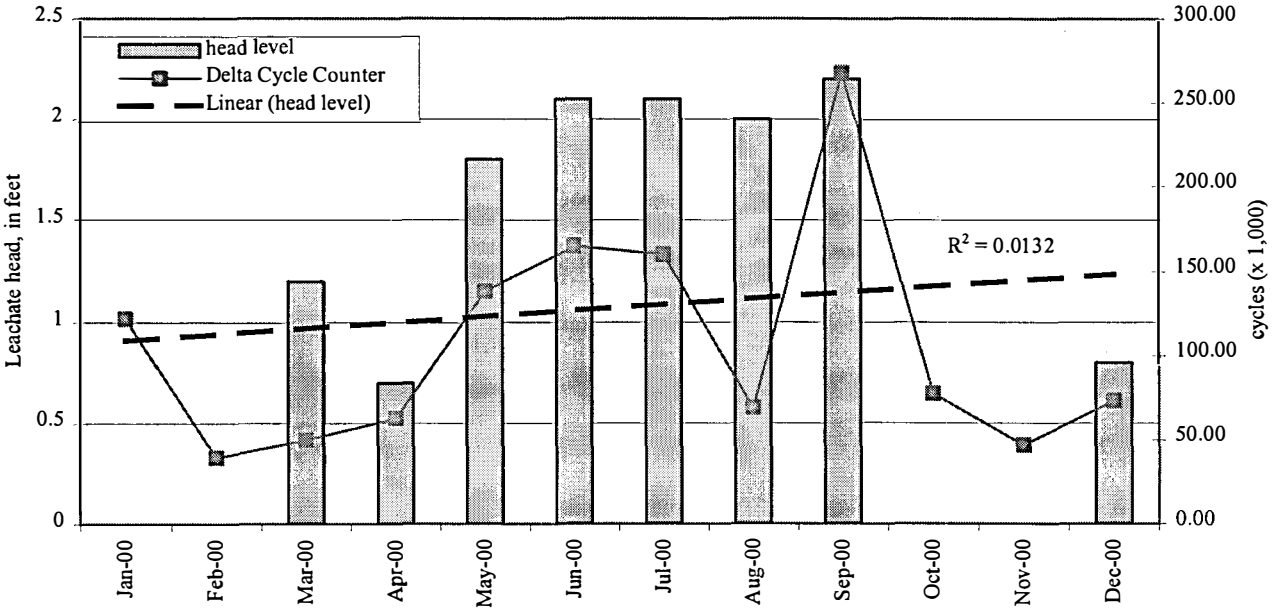


Figure 4-9
GW-8 Monthly Leachate Levels and Pumping

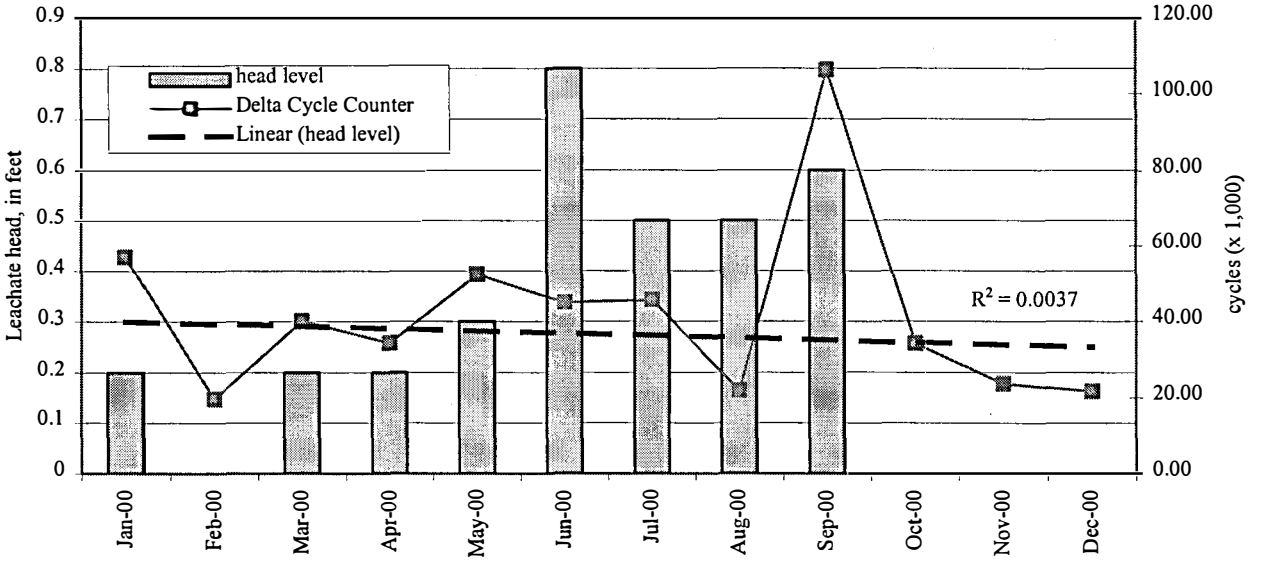


Figure 4-10
GW-9 Monthly Leachate Levels and Pumping

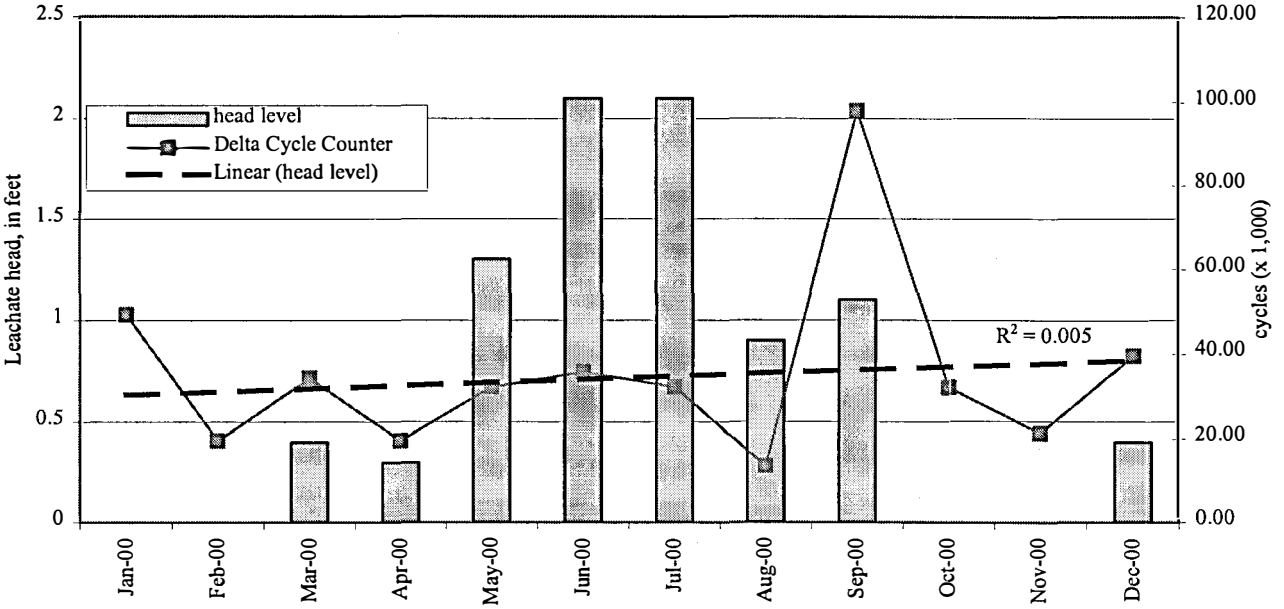


Figure 4-11
GW-10 Monthly Leachate Levels

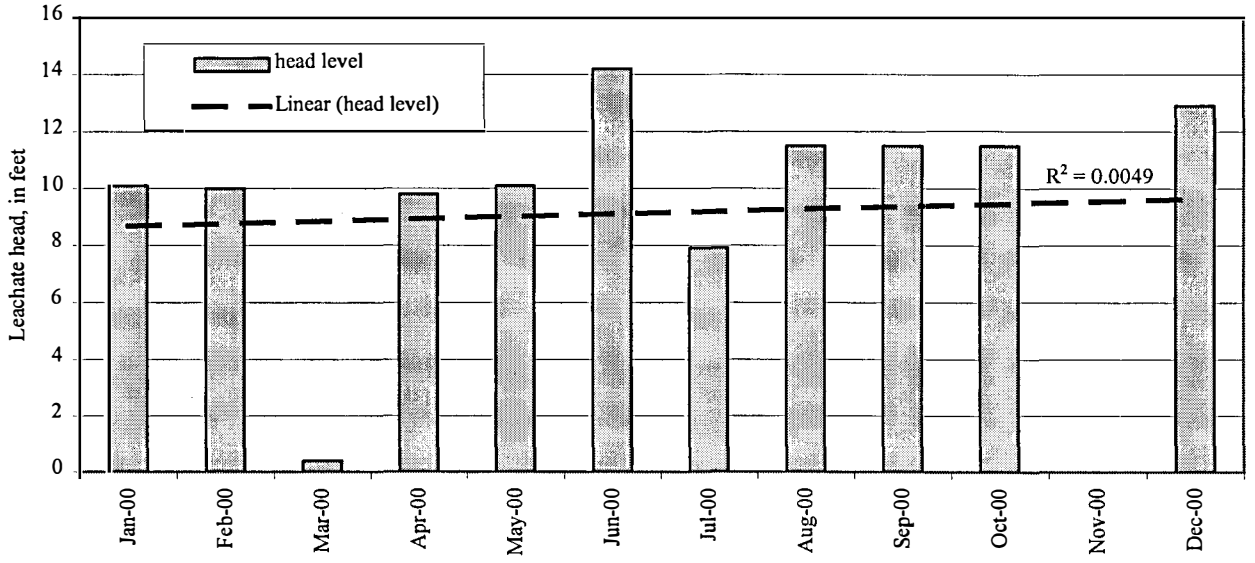


Figure 4-12
GW-11Monthly Leachate Levels and Pumping

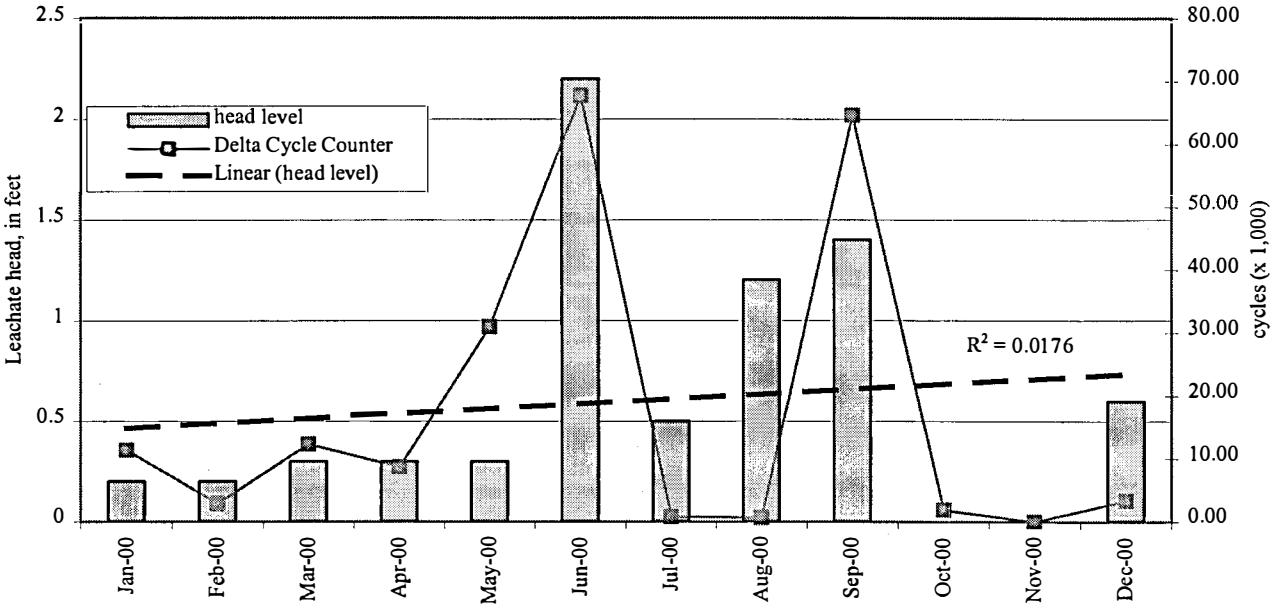


Figure 4-13
GW-12 Monthly Leachate Levels and Pumping

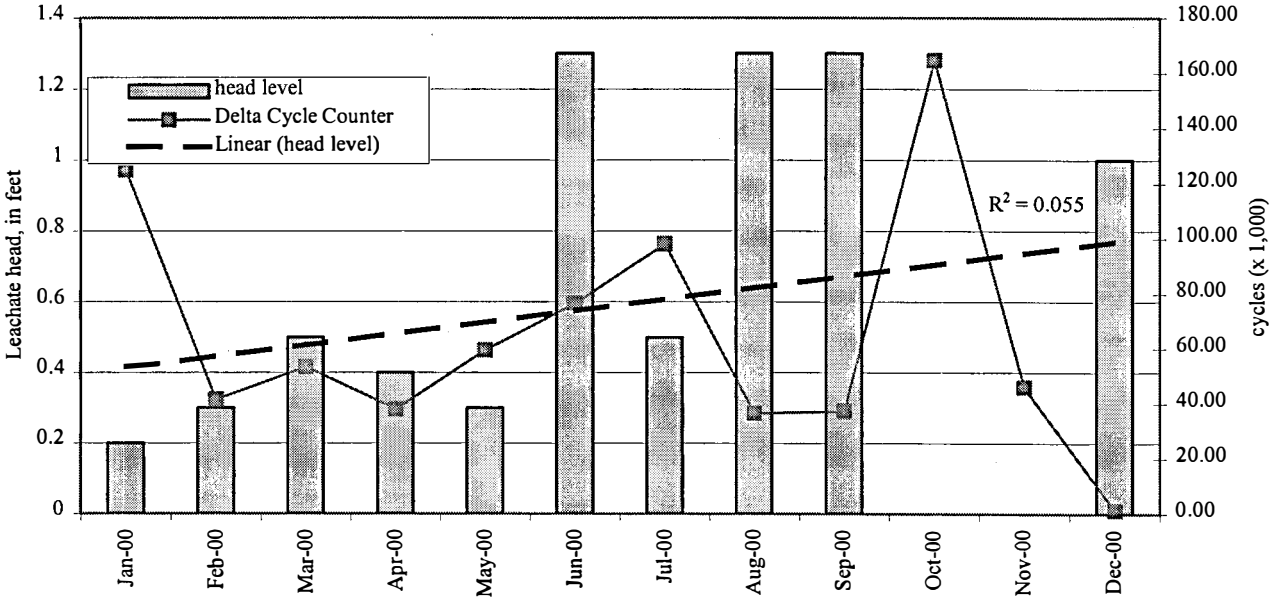
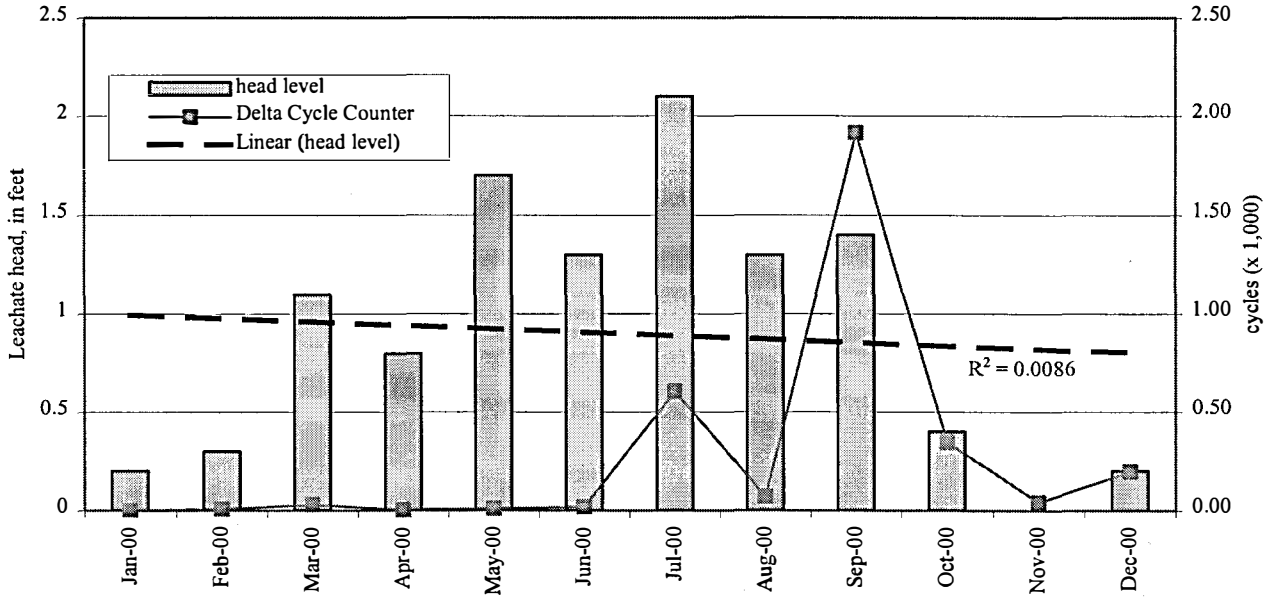


Figure 4-14
GW-13 Monthly Leachate Levels and Pumping



Based on our review of the monthly data, it does appear that leachate levels are increasing in those wells that do not have a pump installed in them. In fact, trending indicates that leachate levels are increasing slightly throughout the entire site, excepting wells GW-8 and GW-13. It does not appear that these increases are of significance however, but they will continue to be monitored.

V. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

The LFG and leachate collection system at the Refuse Hideaway Landfill was operated continuously throughout calendar year 2000. As with any aging system, non-routine operational conditions did arise. Most notably were:

1. A marked reduction in the operational runtime (LFG system) recorded. Modifications are planned in 2001 that will hopefully improve the runtime, and overall reliability of the LFG collection system.

2. Repairs (excavation and resloping) were made to the header piping to correct a low spot between GW-4 and GW-5.

3. Minor repairs were made to the air compressor.

The leachate collection system had no major operational concerns throughout 2000. There is a possibility that some wells are exhibiting an increase in leachate levels, and those wells may require the installation of additional pneumatic pumps.

B. Recommendations for 2001

Additional work will be performed to increase the LFG collection system run-time. The recommended modifications are discussed in previous sections of this report, and will not be readdressed here. However, it is highly likely that additional capital will be necessary to make mechanical and/or instrumentation modifications to the Blower/Flare. These costs and our recommendations will be discussed in greater detail as they are formulated.

Given the age of the landfill and collection systems, continuing routine monitoring and maintenance will likely highlight additional non-routine repair items; these cannot be accurately predicted, and will need to be dealt with on a case-by-case basis.

SCS-FS recommends that the current operation and maintenance schedule be continued throughout 2001, with alterations as necessary following any modifications made to the Blower/Flare.