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**SCS FIELD SERVICES**

July 1, 2002
File No. 07197026.00

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

Subject: 2001 Draft Annual Report of Operations for the Refuse Hideaway Landfill

Dear Hank:

Enclosed, please find our draft annual report for Refuse Hideaway Landfill. As this is our first annual report, please provide me with critical comments for content and format. I will incorporate your comments or corrections into a final version.

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.**

# 2001 ANNUAL OPERATION REPORT FOR THE LANDFILL GAS AND LEACHATE COLLECTION SYSTEMS REFUSE HIDEAWAY LANDFILL MIDDLETON, WISCONSIN

**Prepared for:**
**Wisconsin Department of Natural Resources**
**3911 Fish Hatchery Road**
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## CONTENTS

## I. INTRODUCTION

SCS Field Services (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 2001. This report will highlight the data collected during 2001, 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.

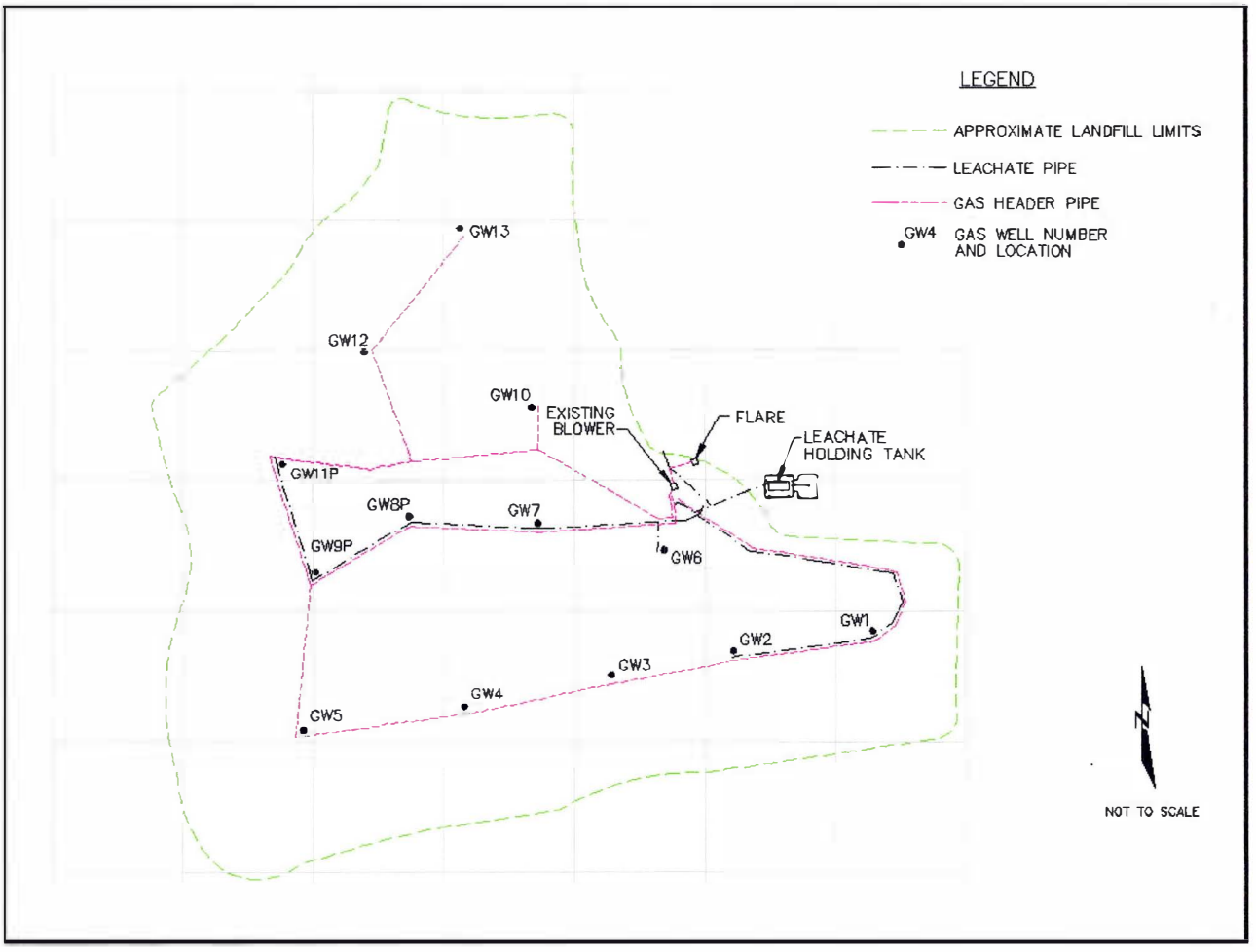
LFG and leachate is collected primarily to prevent and/or minimize off-site migration of contaminants. Given this, it is desirous to operate both collection systems continuously (greater than 90 percent runtime), and to maintain "moderate" LFG quality (methane greater than 40 percent, oxygen less than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



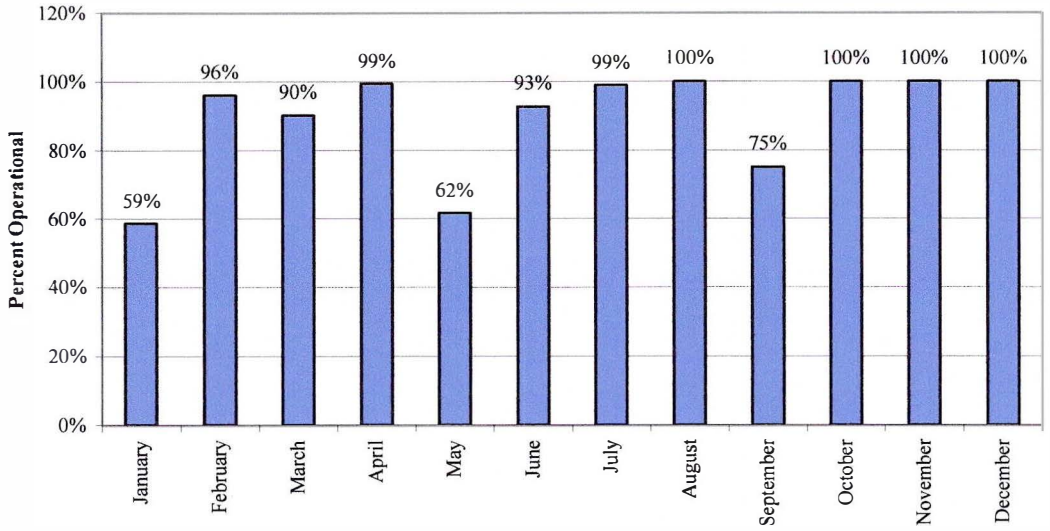

## III. LFG SYSTEM OPERATIONS

### A. Blower/Flare Station

The blower/flare station (BFS) was operational throughout 2001, and the overall system runtime was much improved over the values calculated for 2000 (89 percent for 2001, versus 44 percent for 2000). SCS-FS and our subcontractor (Environmental Sampling Corporation – Muskego, Wisconsin) were continuously working to improve the runtime of the BFS. In September 2001, various mechanical and instrumentation modifications were performed at the BFS, with the result being almost 100 percent operational status following the repairs.

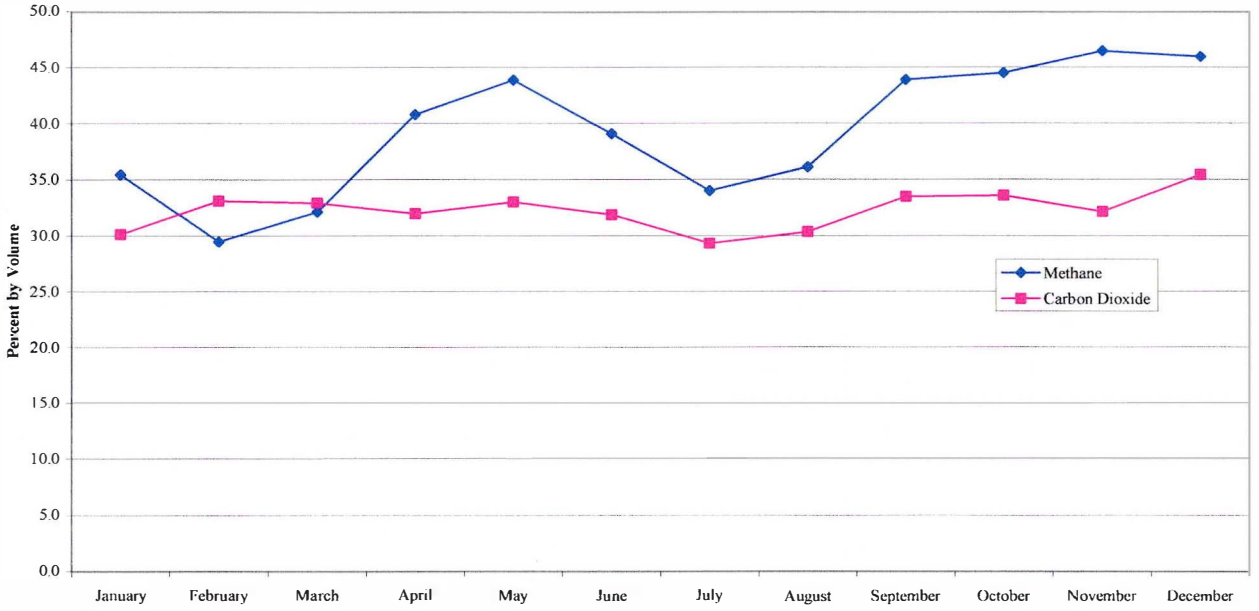
The monthly runtimes are shown below in figure 3-1. Between January and September 2001, the BFS was operated using almost a continuous pilot of propane, as it was determined that this would improve the system runtime. Subsequent to the repairs in September, the flare ran at 100 percent of the available time. Again, SCS-FS and Environmental Sampling Corporation (ESC) will continue to monitor the BFS runtime.

**Figure 3-1**
**Refuse Hideaway 2001**
**Average Monthly Runtime**



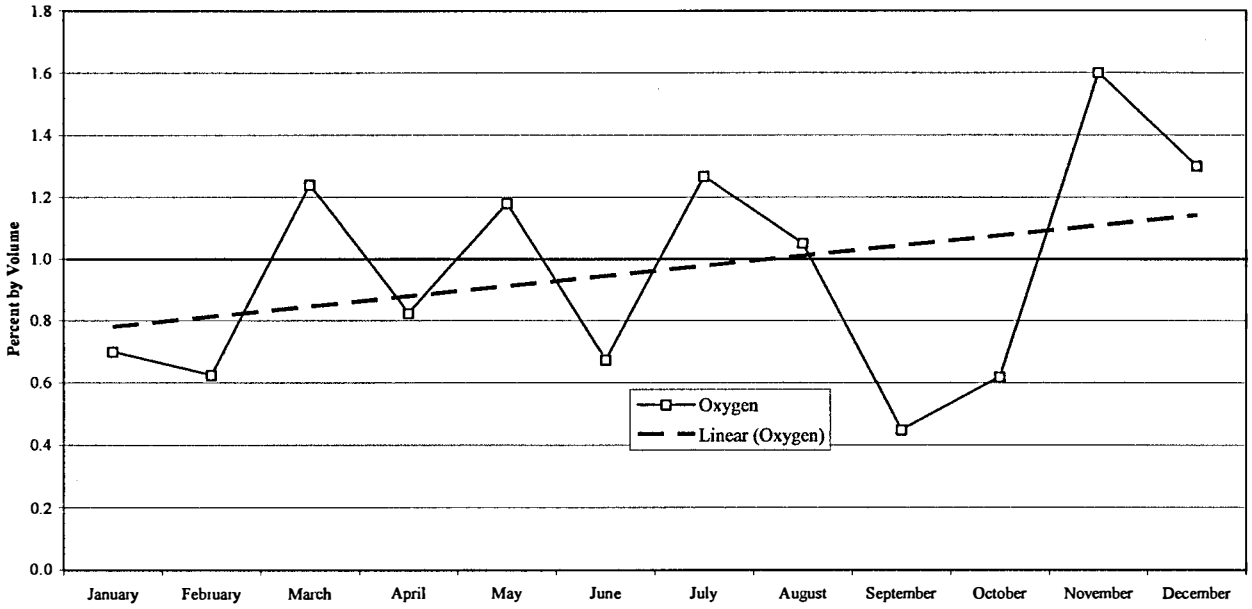

Throughout 2001, the average methane and carbon dioxide quality remained relatively consistent. Historically, an LFG control system such as the LFG system at the Site should operate with methane greater than 40 percent, by volume. The carbon dioxide should remain relatively constant, and stay greater than 30 percent. A summary of the weekly BFS LFG quality readings is shown in Figure 3-2.

**Figure 3-2**
**Refuse Hideaway 2001**
**Average Monthly LFG Quality**



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 six months of 2001: March, May, July, August, November, and December. A linear trendline indicates that oxygen may be trending higher. This is an issue that may require attention during 2002 and beyond.

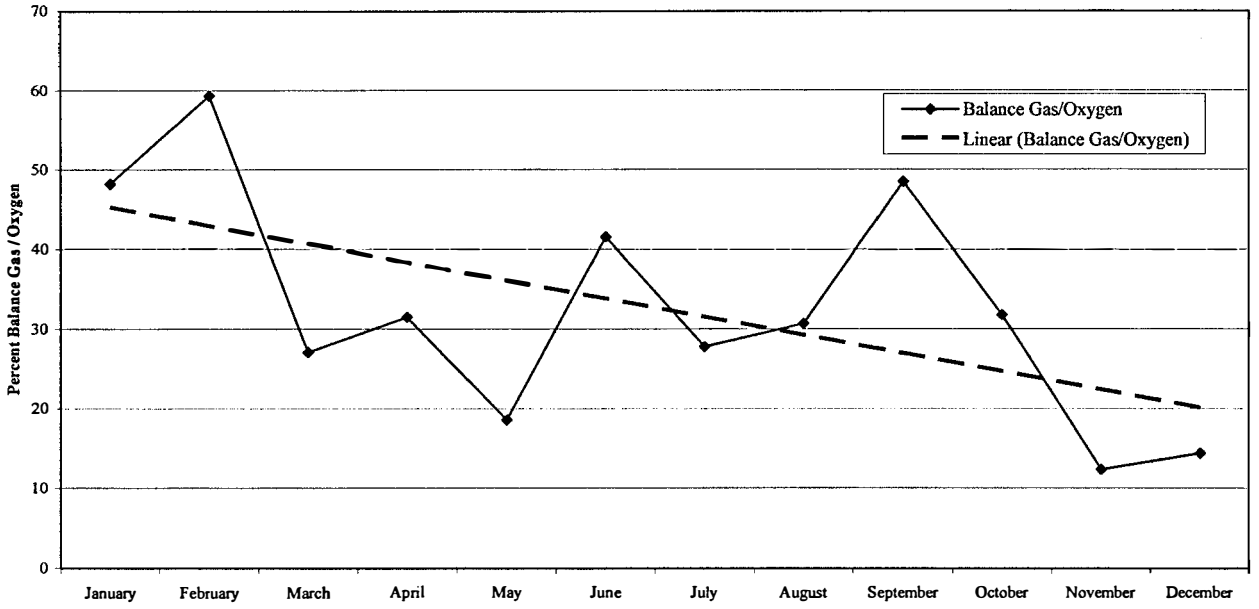
**Figure 3-3**
**Refuse Hideaway 2001**
**Average Monthly LFG Quality**




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 the majority of 2001, the ratio of balance gas to oxygen was higher than in ambient air. This is not uncommon in older, closed sites. That being said, the trending of the data indicates that this ratio was improving, and showing less nitrogen in the LFG. This indicates that leaks were repaired, and/or that better wellfield tuning was being performed.

**Figure 3-4**
**Refuse Hideaway 2001**
**Average Monthly LFG Quality**




## B. LFG Collection Wellfield

The wellfield was maintained in good operational condition throughout 2001. No major problems were noted with the wells or the wellheads. A low spot between GW-4 and GW-5 previously repaired by SCS-FS in July 2000, may be reoccurring; however this has not blocked LFG collection from GW-5. No other operational issues related to the physical condition of the wellfield required attention in 2001.

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**

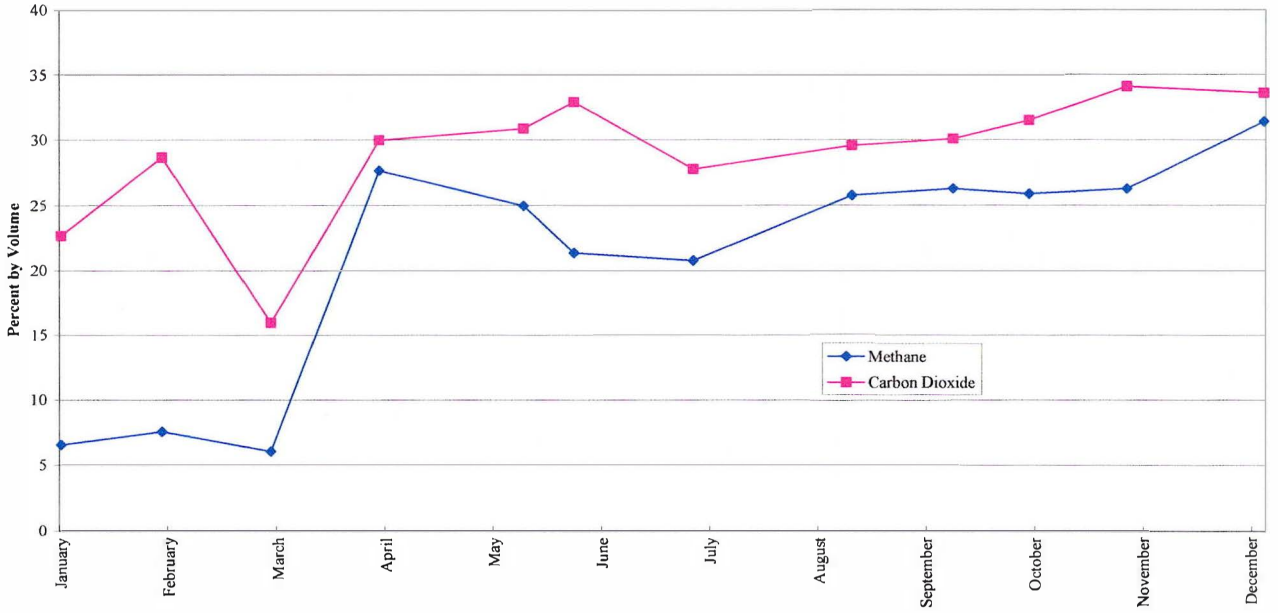



**Figure 3-6**
**GW-2 Gas Quality**

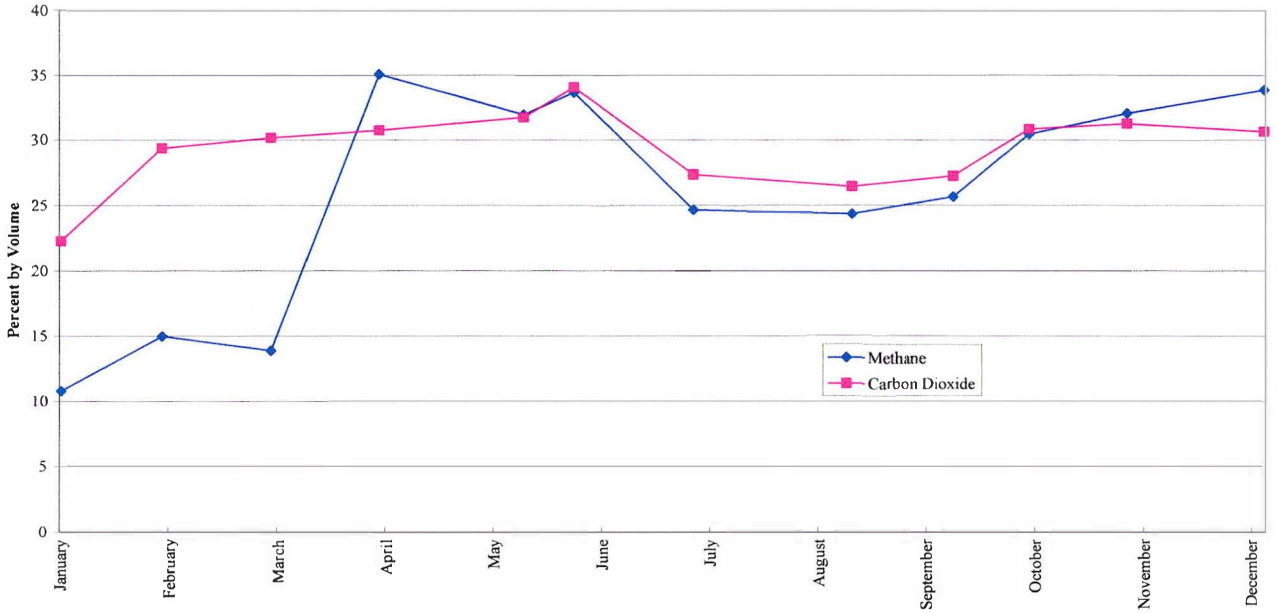


**Figure 3-7**
**GW-3 Gas Quality**

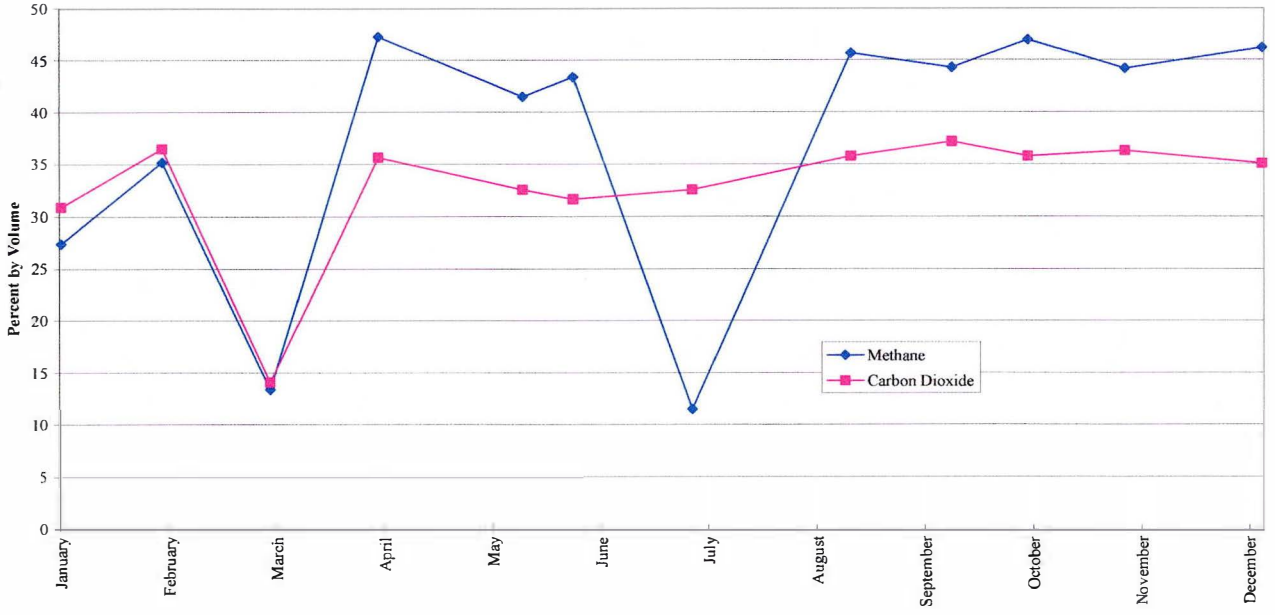



**Figure 3-8**
**GW-4 Gas Quality**

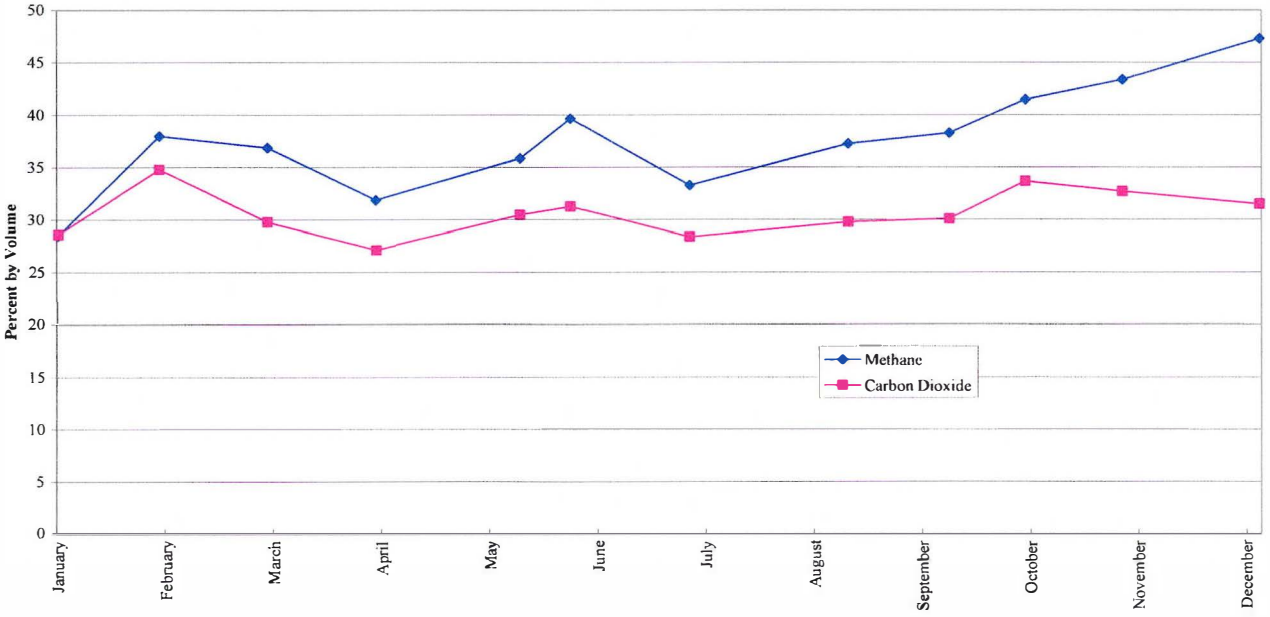


**Figure 3-9**
**GW-5 Gas Quality**

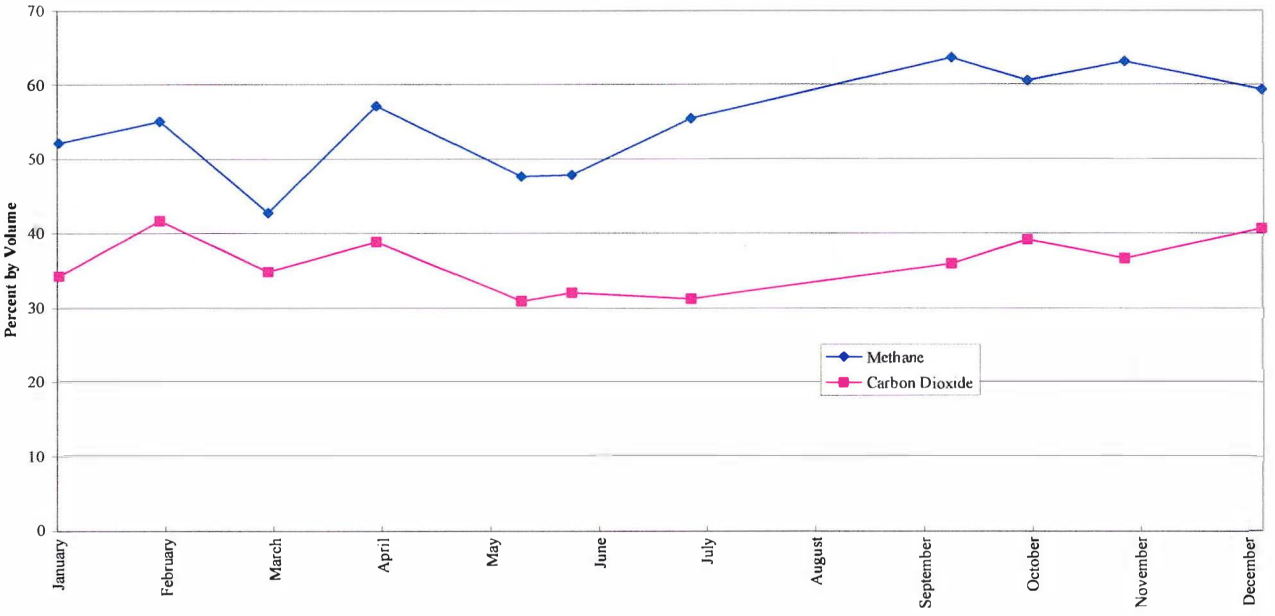



**Figure 3-10**
**GW-6 Gas Quality**

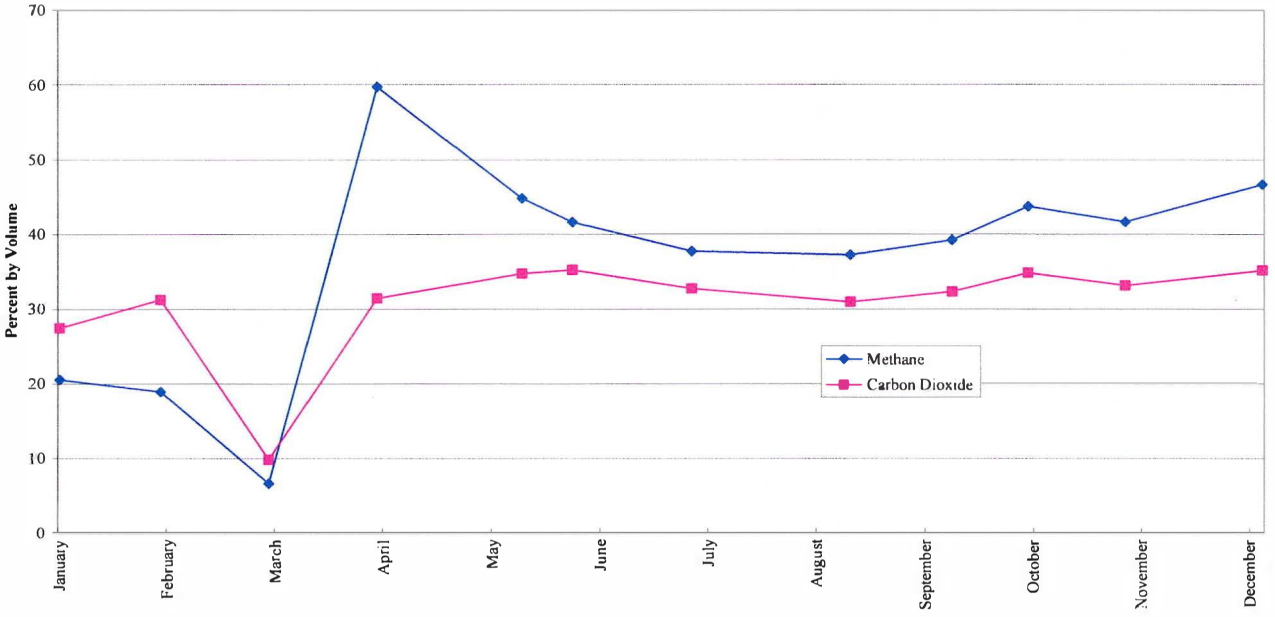


**Figure 3-11**
**GW-7 Gas Quality**

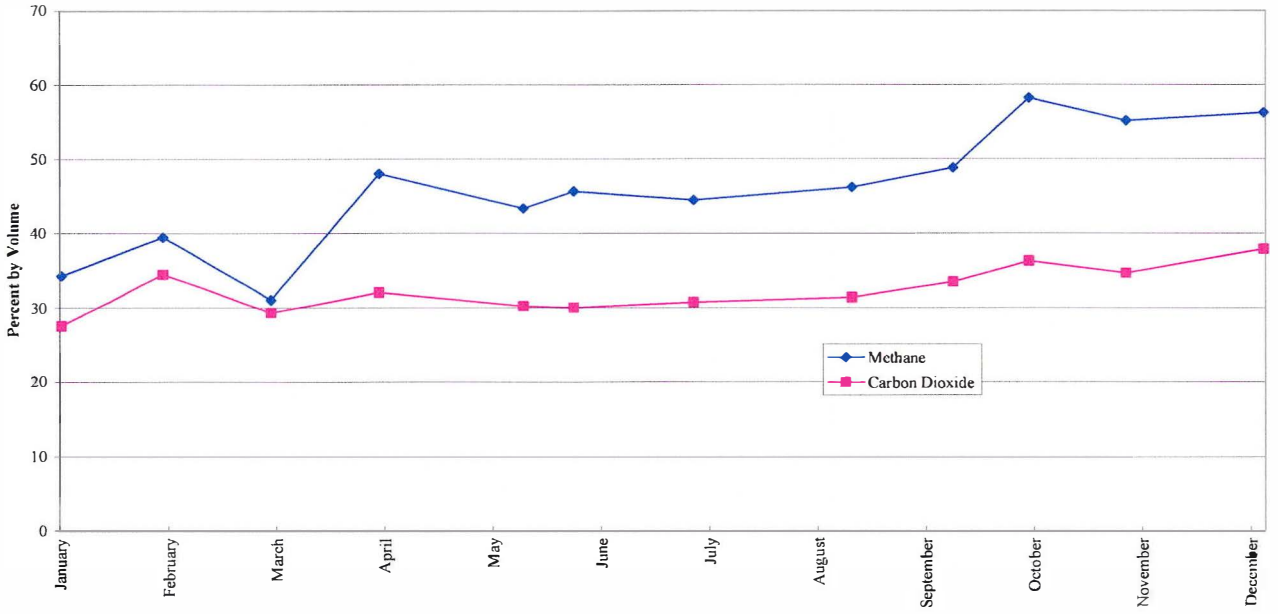



**Figure 3-12**
**GW-8 Gas Quality**

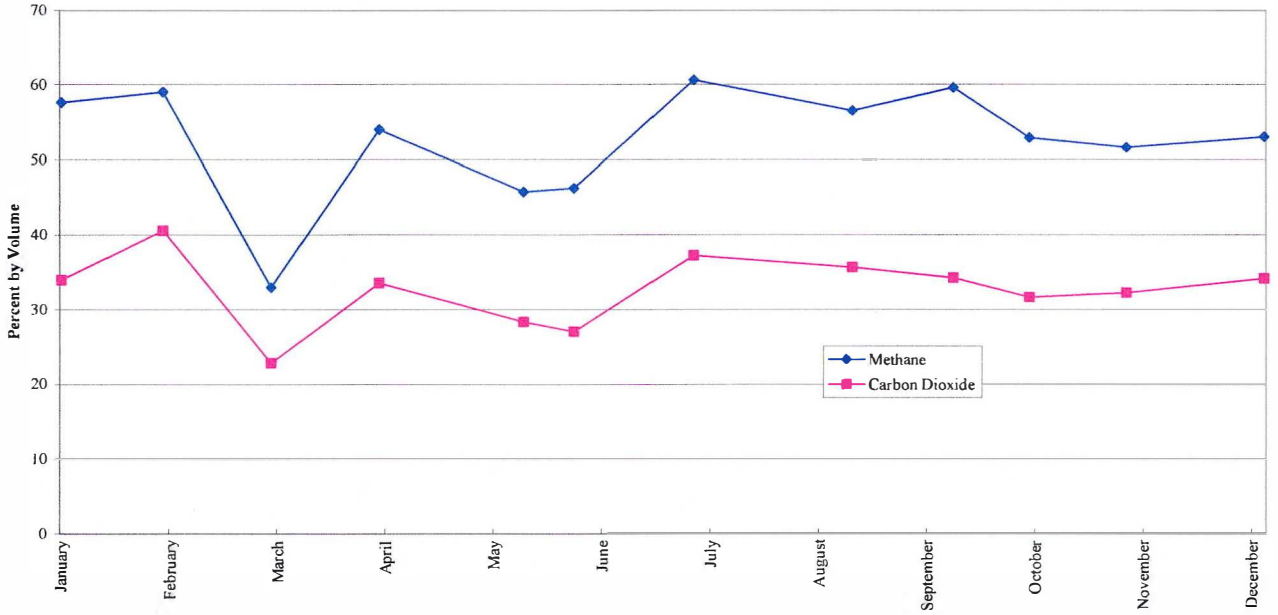


**Figure 3-13**
**GW-9 Gas Quality**

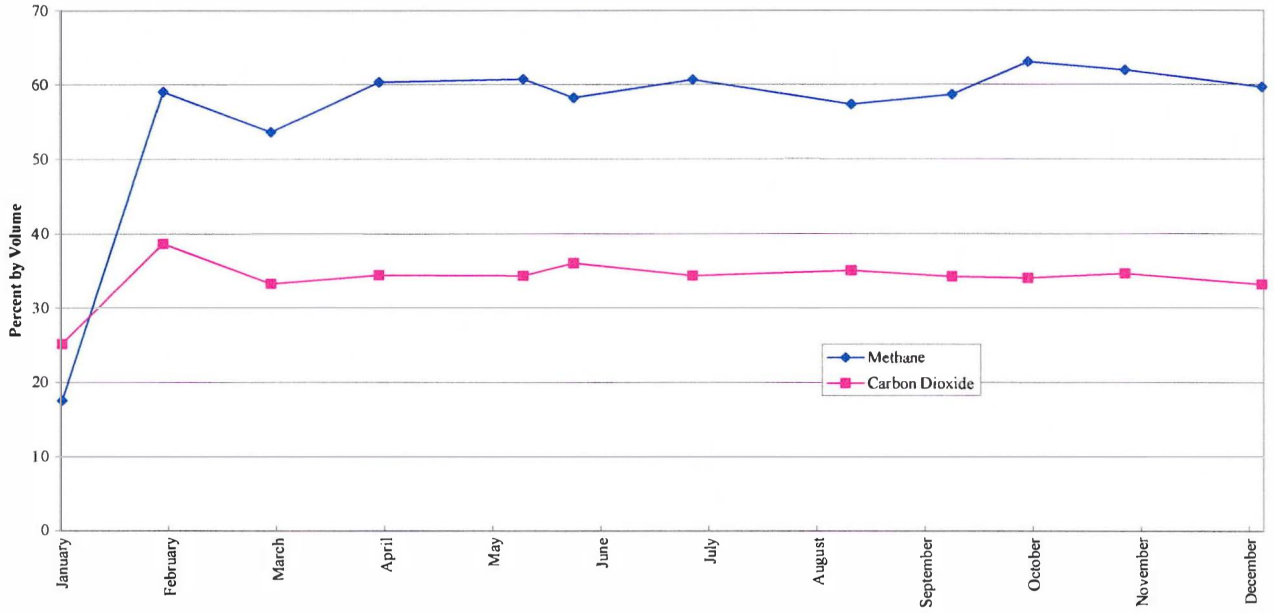



**Figure 3-14**
**GW-10 Gas Quality**

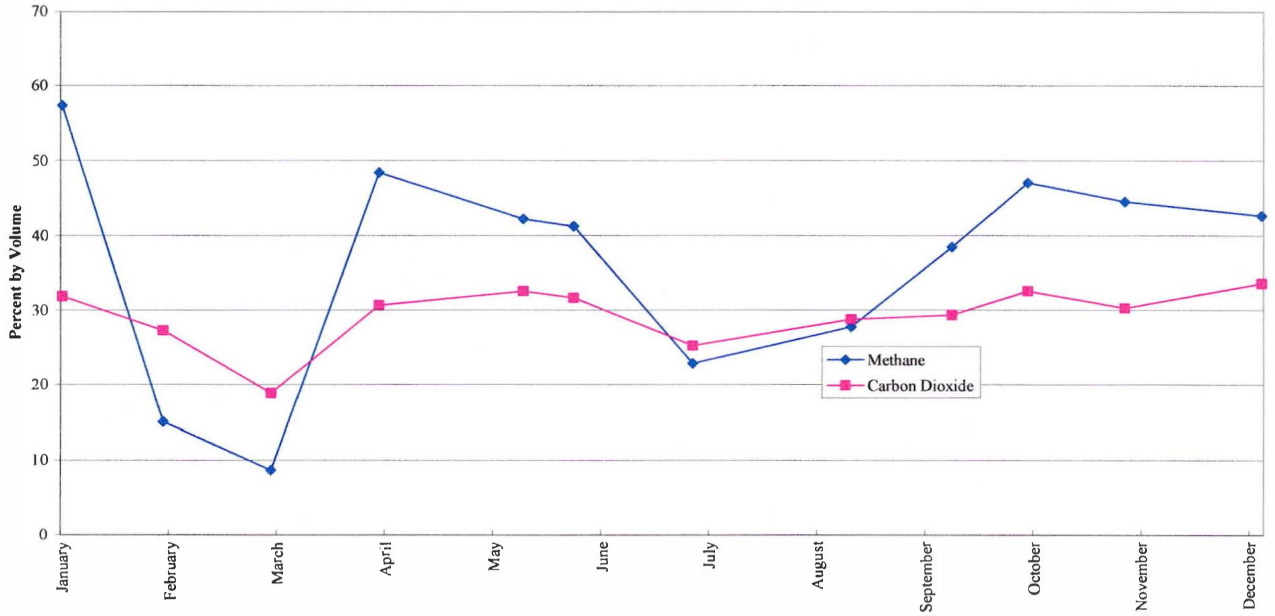


**Figure 3-15**
**GW-11 Gas Quality**

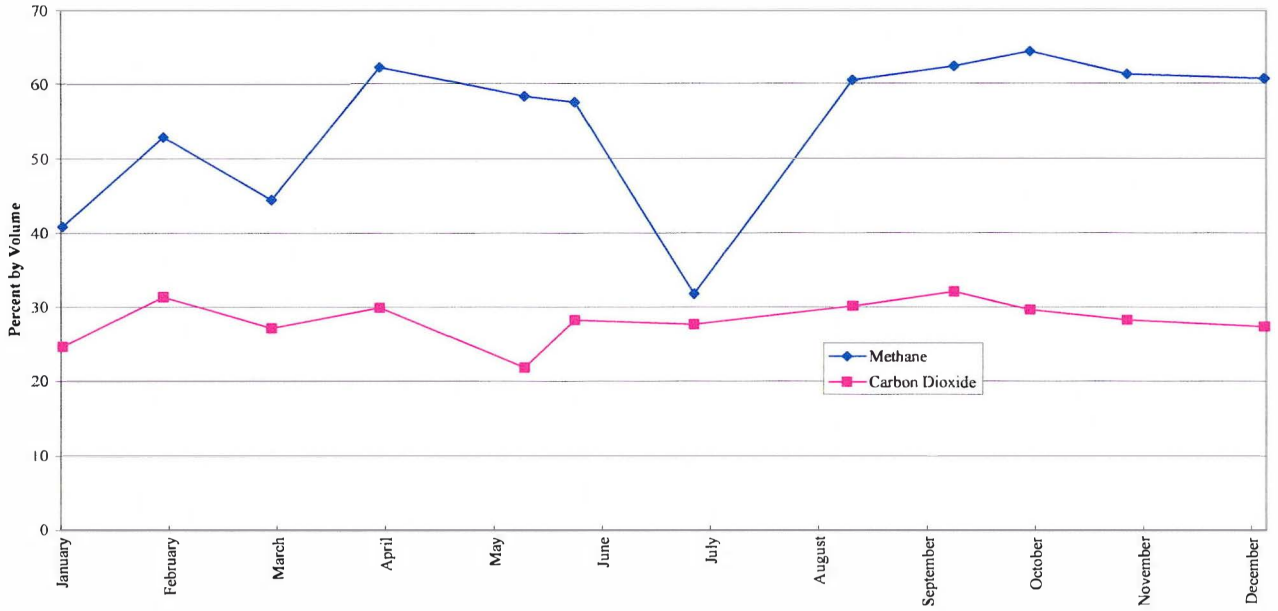



**Figure 3-16**
**GW-12 Gas Quality**

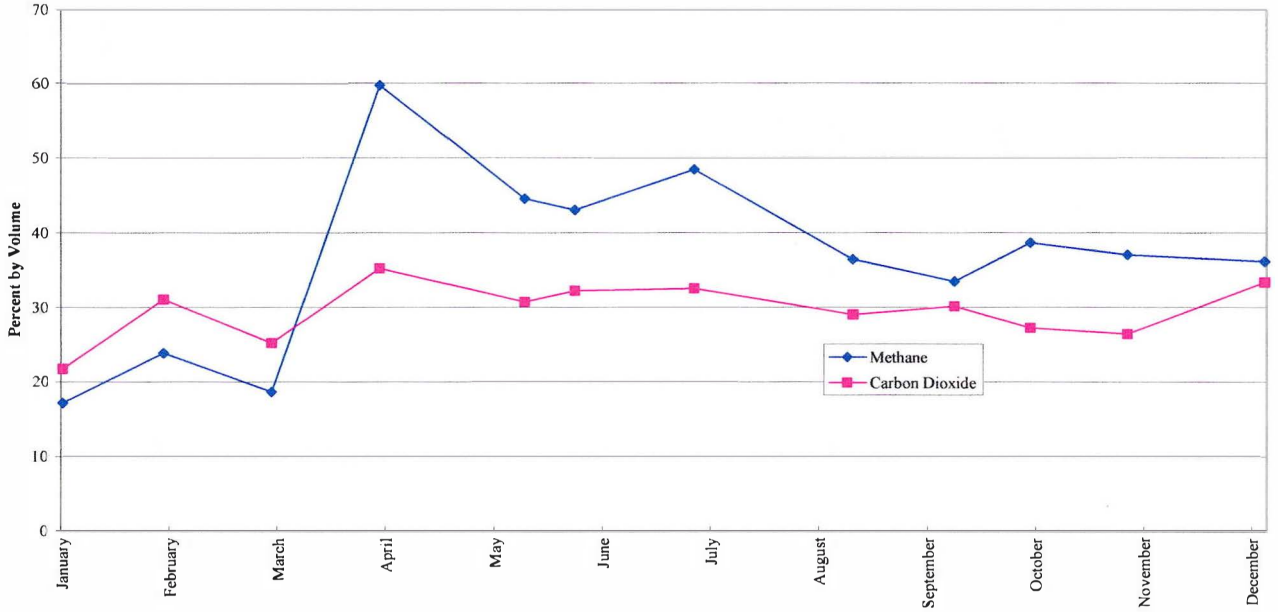
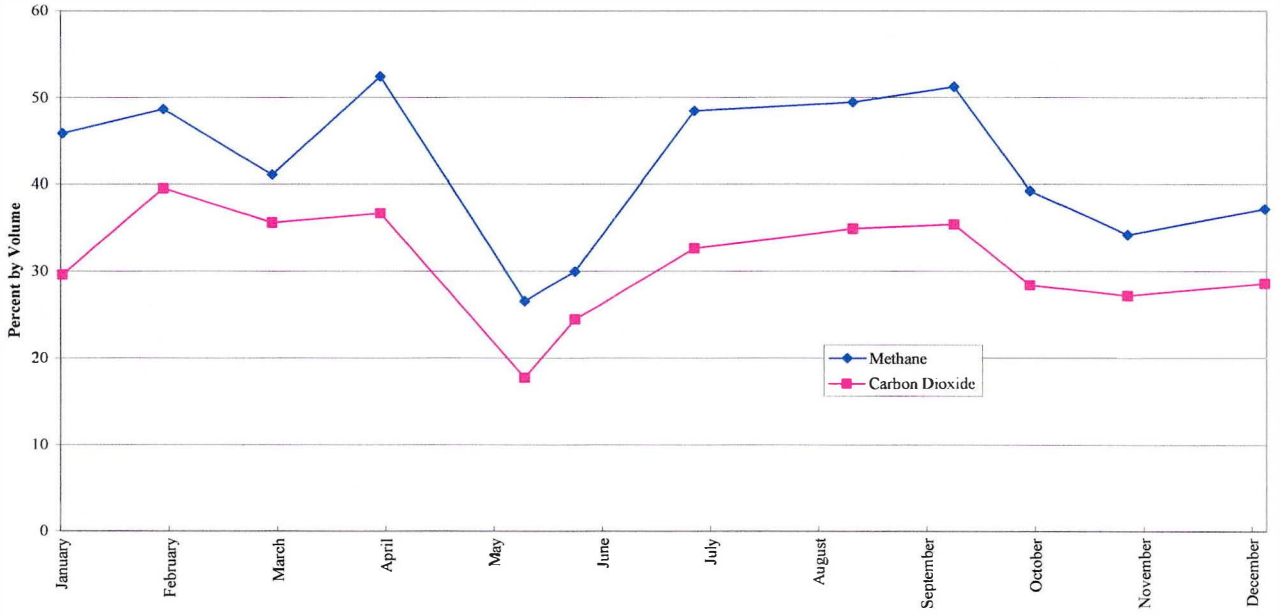


**Figure 3-17**
**GW-13 Gas Quality**




As the above figures indicate, the LFG quality remained relatively constant throughout the year, with some wells indicating slightly improving LFG quality towards year end. 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. Methane in excess of the lower explosive level (5 percent, or LEL) was detected in two of the probes during the monthly events performed in 2001. Those wells, the dates, and their associated methane levels are summarized below

| Probe | Date | Methane Level (%,v/v) |
|---|---|---|
| **GP-11D** | 4/26/2001 | 5.2 |
| | 5/30/2001 | 10.6 |
| | 7/31/2001 | 5.4 |
| | 8/28/2001 | 14.3 |
| | 9/26/2001 | 11.6 |
| **GP-11S** | 5/30/2001 | 8.4 |
| | 8/28/2001 | 9.6 |
| | 9/26/2001 | 17.9 |
| | 10/17/2001 | 11.5 |

| Probe | Date | Methane Level (%,v/v) |
|---|---|---|
| | 11/13/2001 | 9.6 |
| | 12/21/2001 | 8.7 |

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 2001.

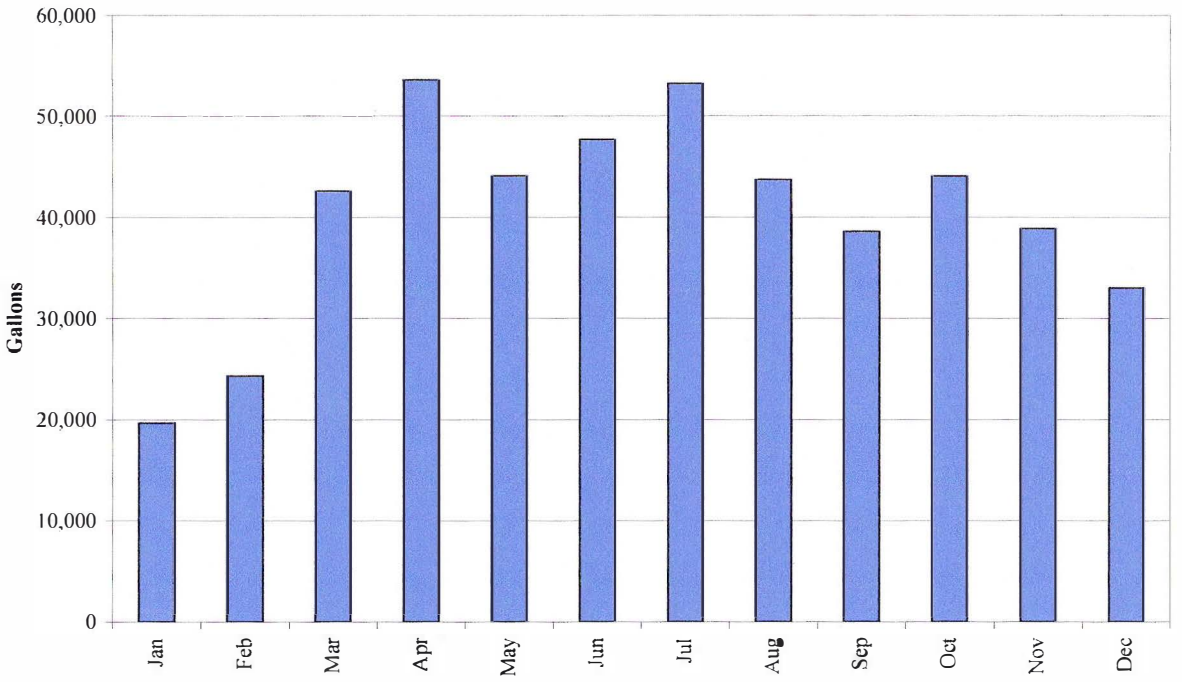
## IV. LEACHATE COLLECTION SYSTEM

### A. Summary of 2001 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.

In 2001, 100 loads of leachate totaling approximately 483,000 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**

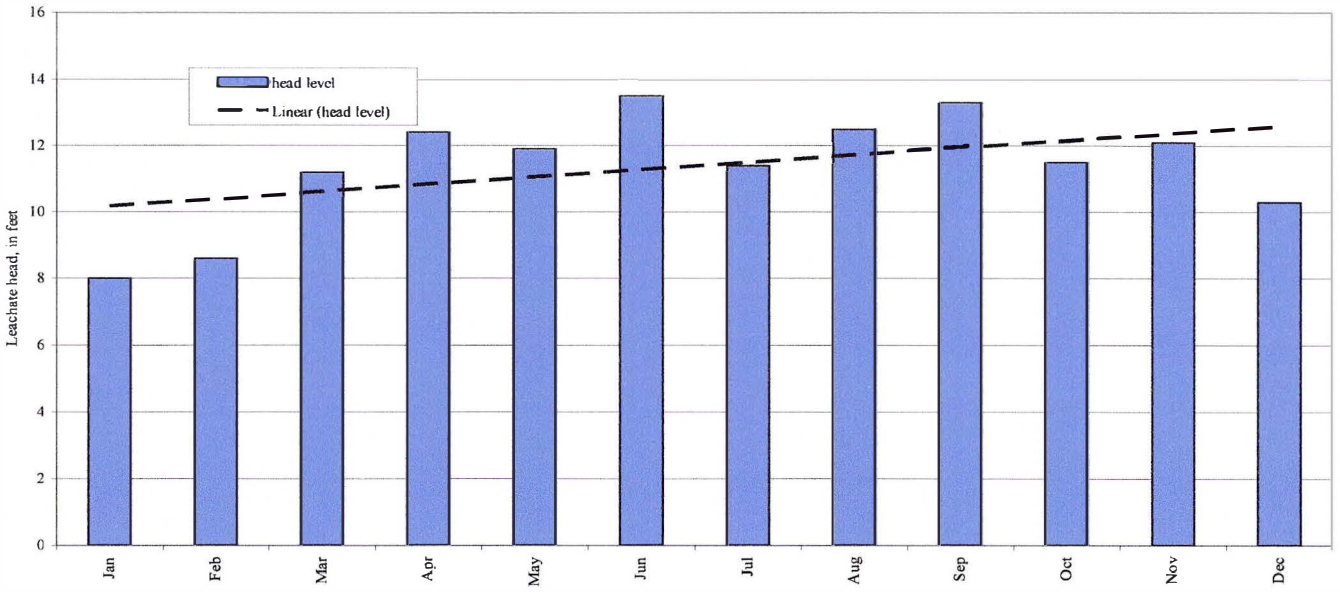


**Figure 4-3**
**GW-2 Monthly Leachate Levels**

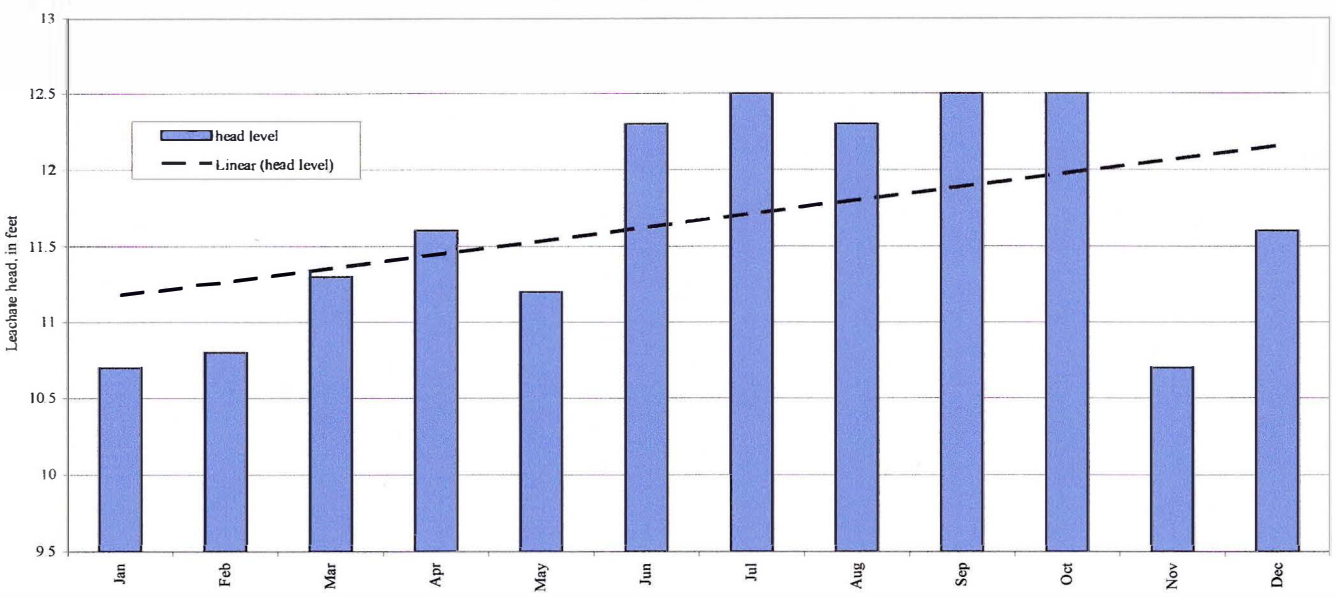



**Figure 4-4**
**GW-3 Monthly Leachate Levels**

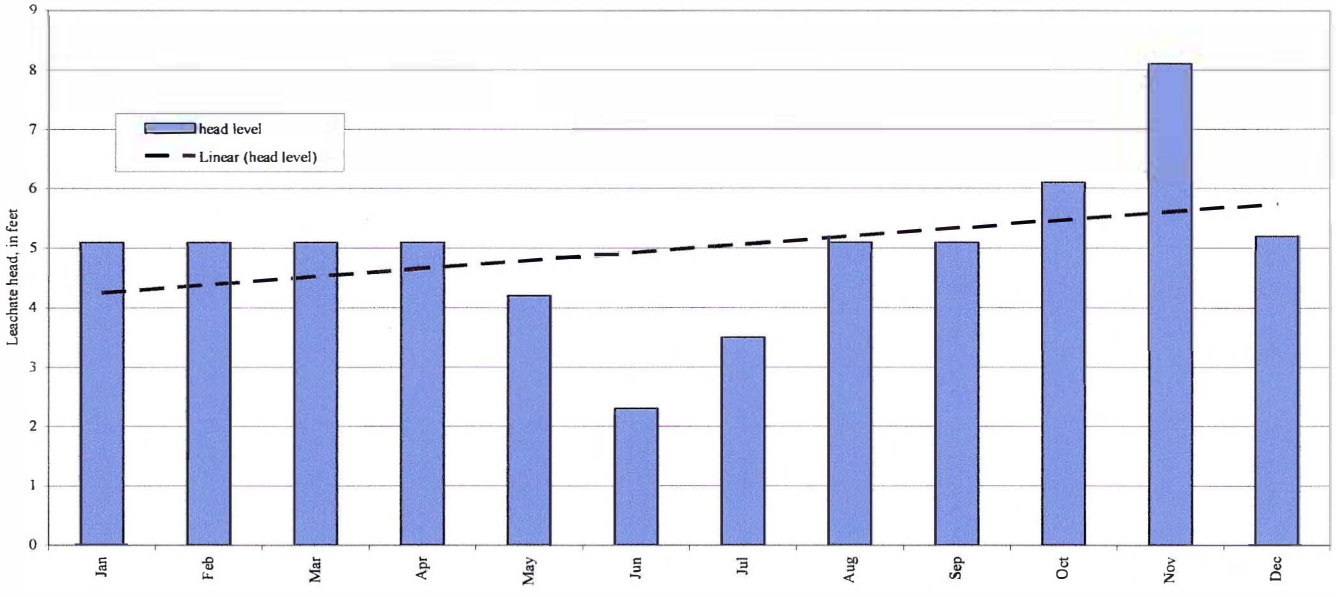


**Figure 4-5**
**GW-4 Monthly Leachate Levels and Pumping**

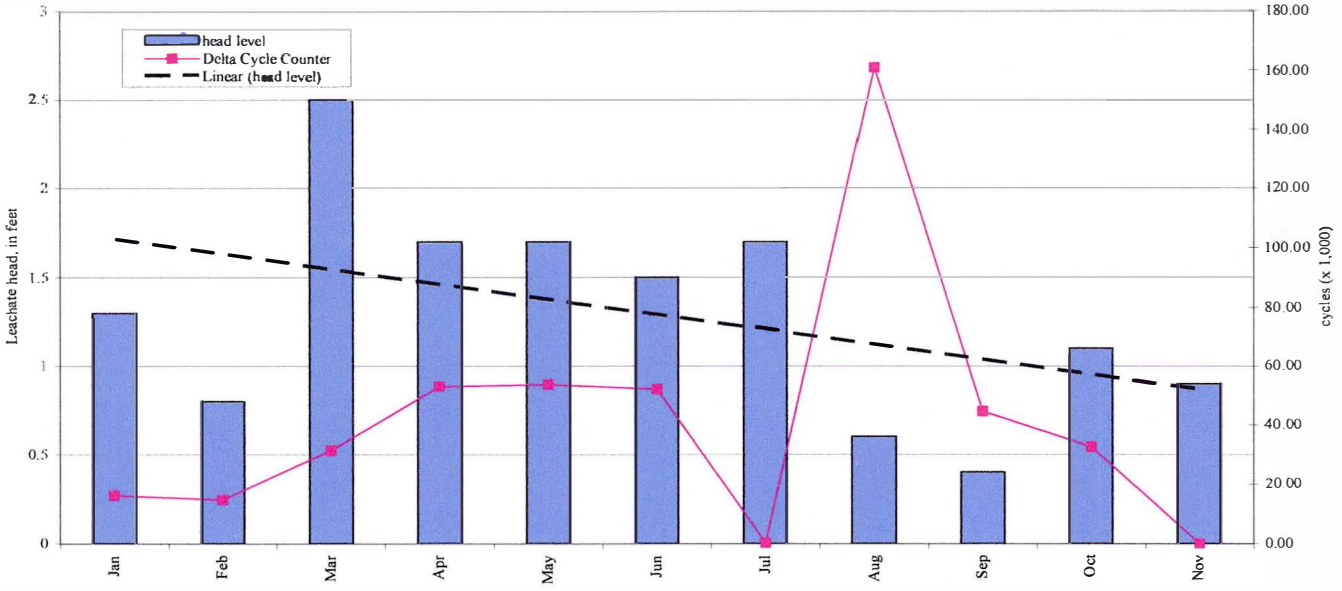



**Figure 4-6**
**GW-5 Monthly Leachate Levels and Pumping**

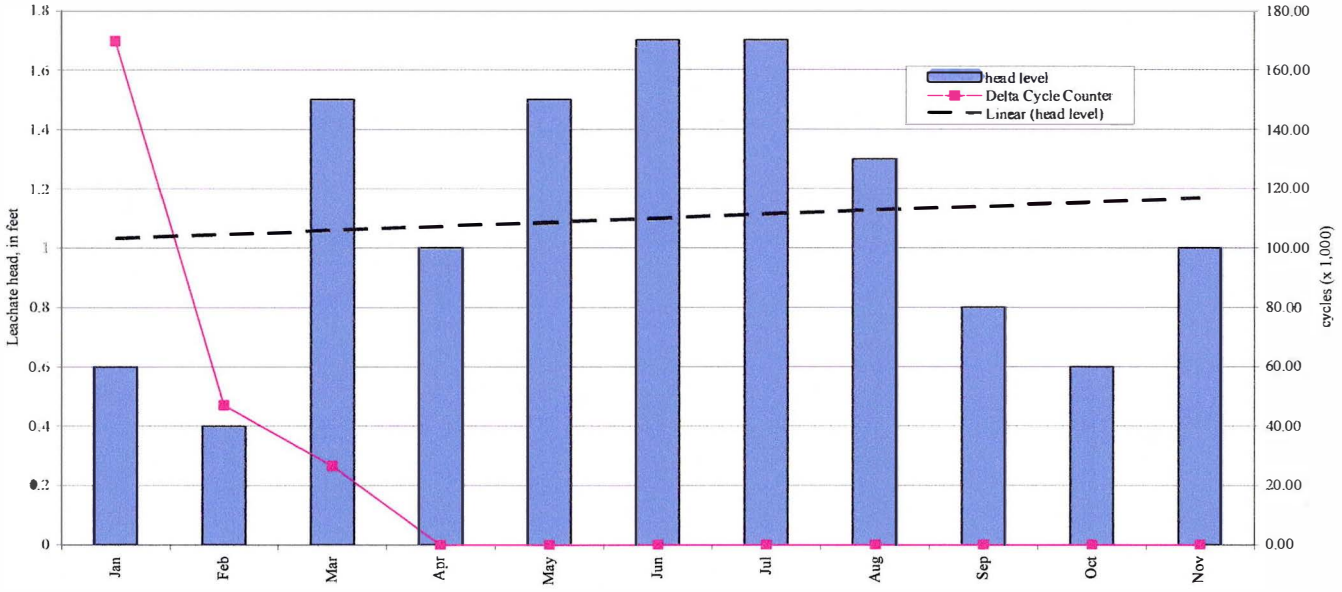


**Figure 4-7**
**GW-6 Monthly Leachate Levels**

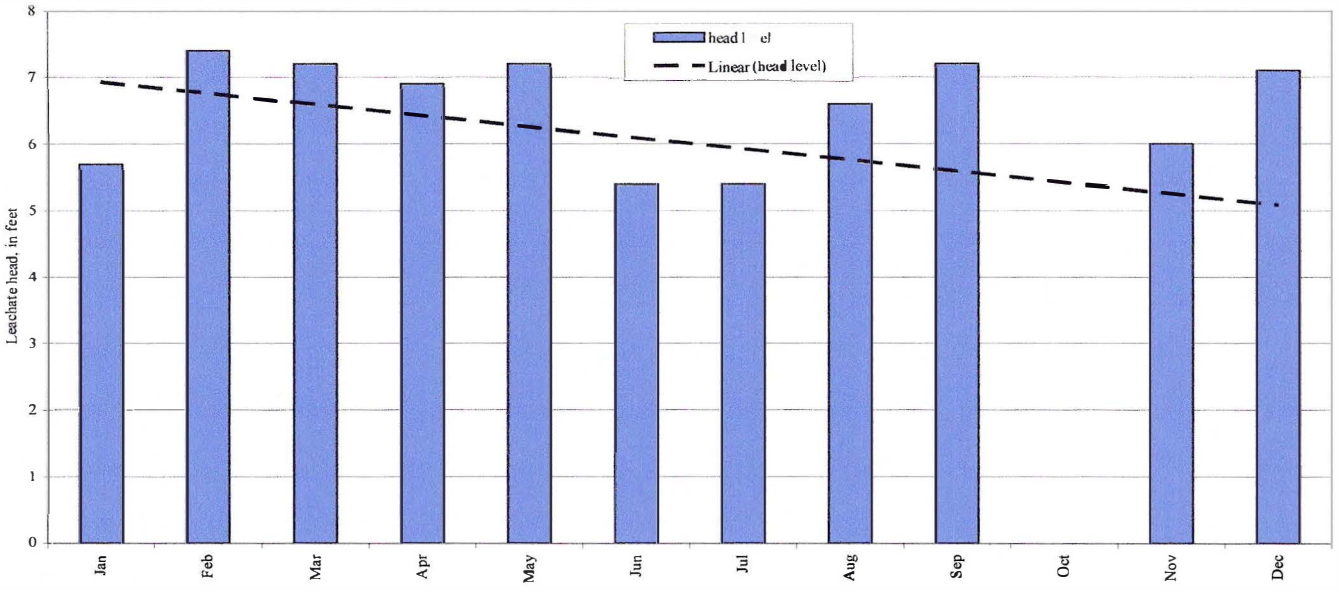



**Figure 4-8**
**GW-7 Monthly Leachate Levels and Pumping**

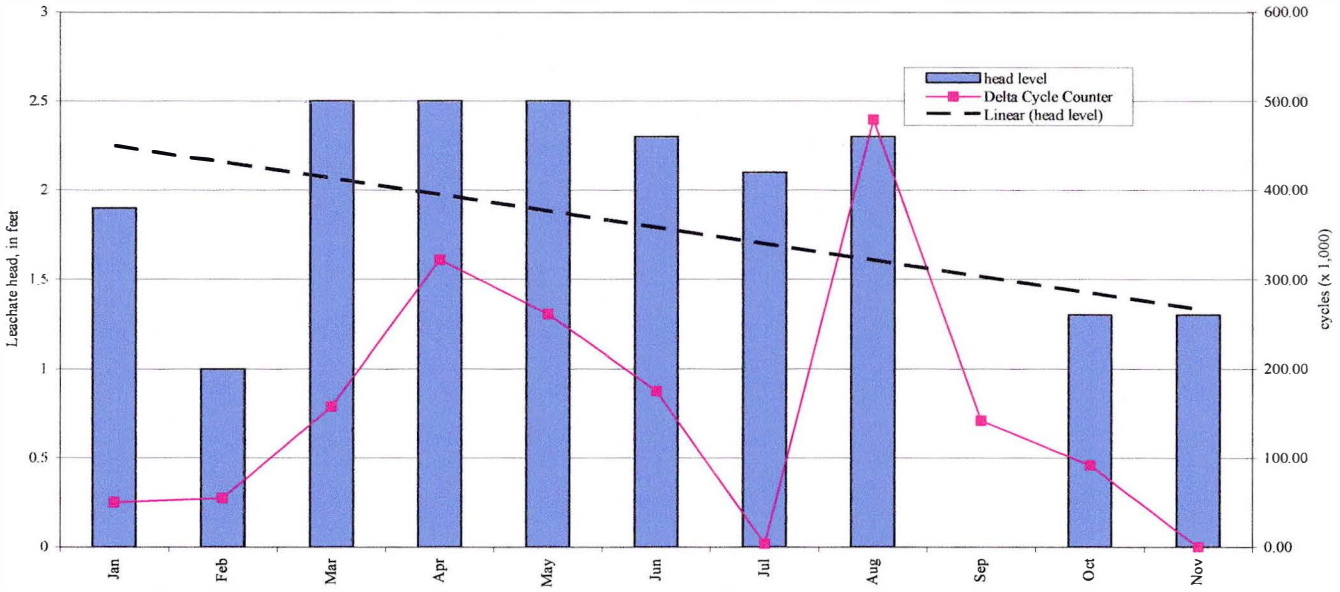


**Figure 4-9**
**GW-8 Monthly Leachate Levels and Pumping**

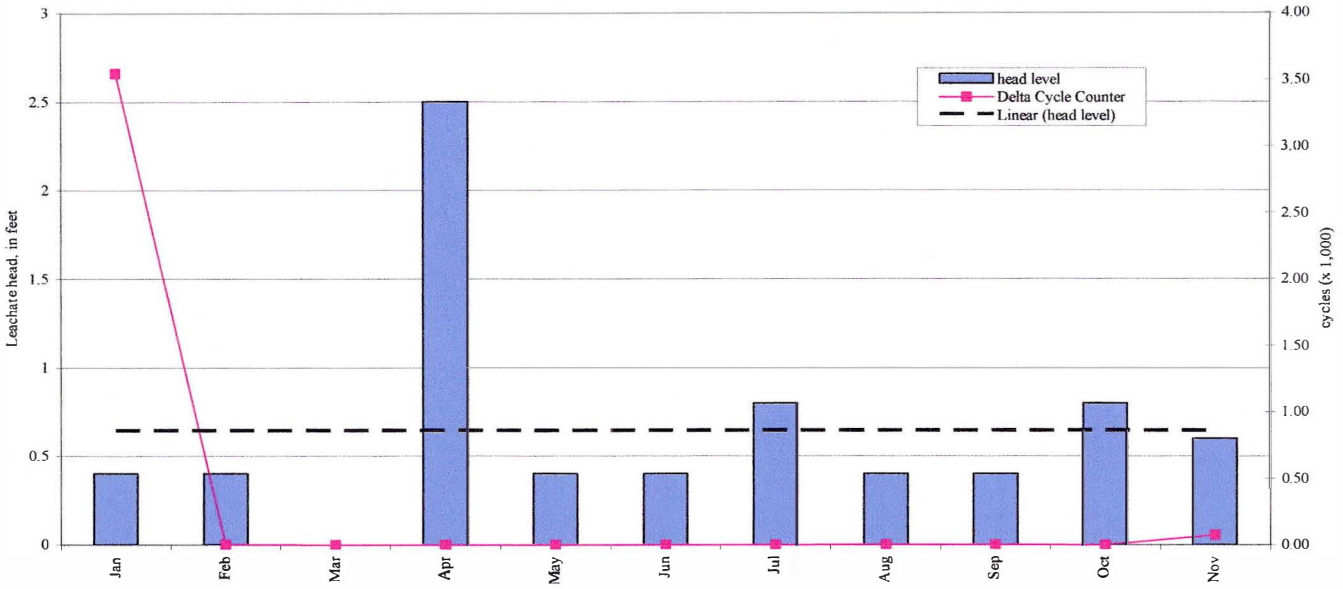



**Figure 4-10**
**GW-9 Monthly Leachate Levels and Pumping**

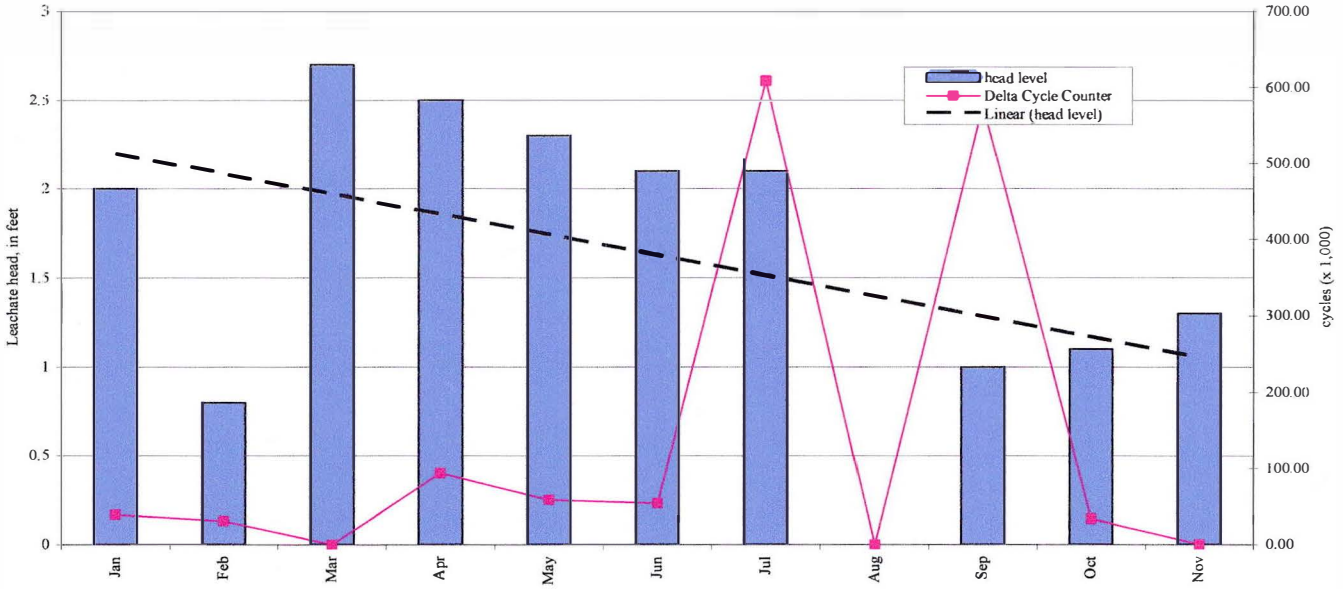


**Figure 4-11**
**GW-10 Monthly Leachate Levels**

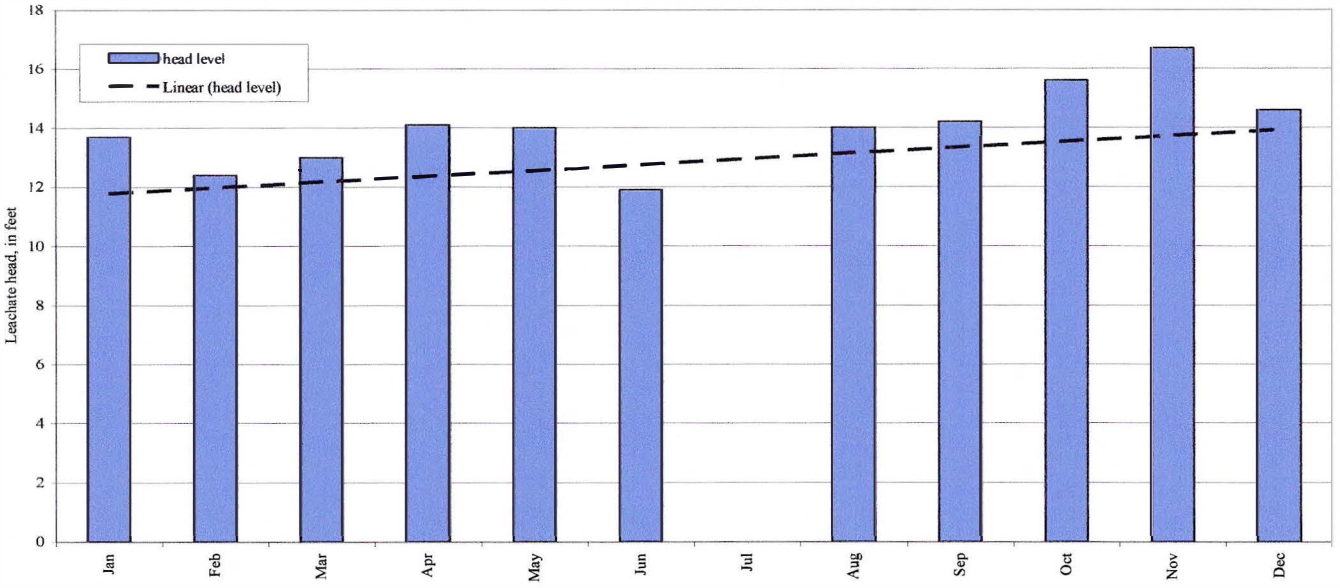



**Figure 4-12**
**GW-11 Monthly Leachate Levels and Pumping**

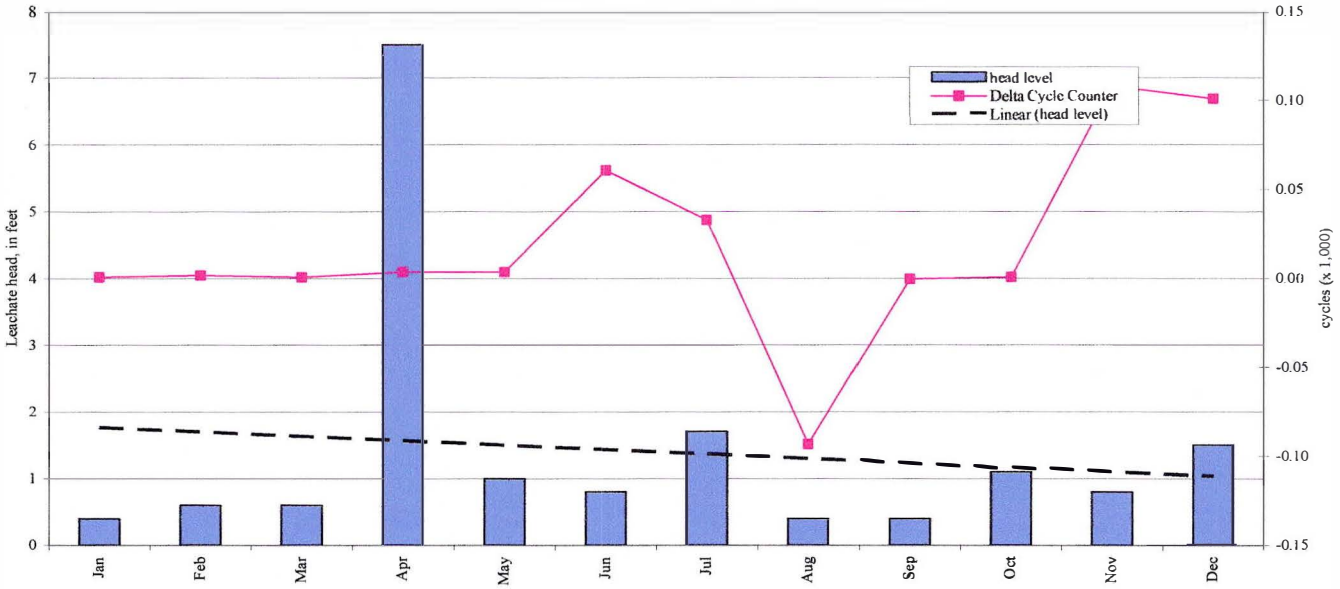


**Figure 4-13**
**GW-12 Monthly Leachate Levels and Pumping**

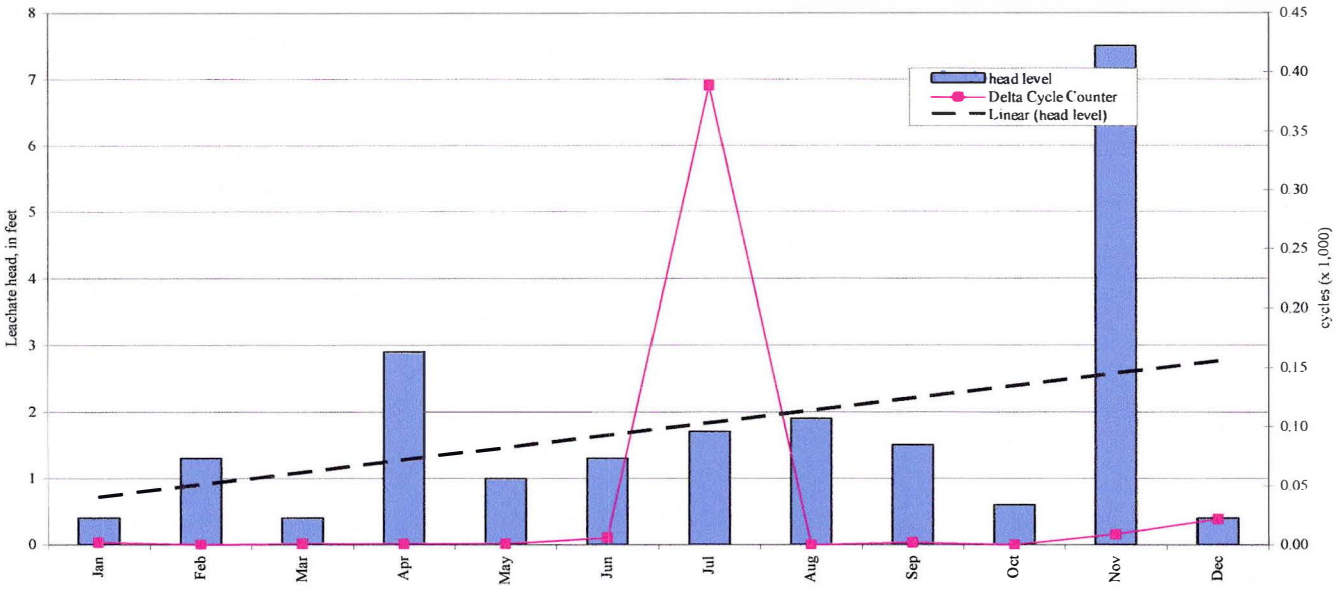
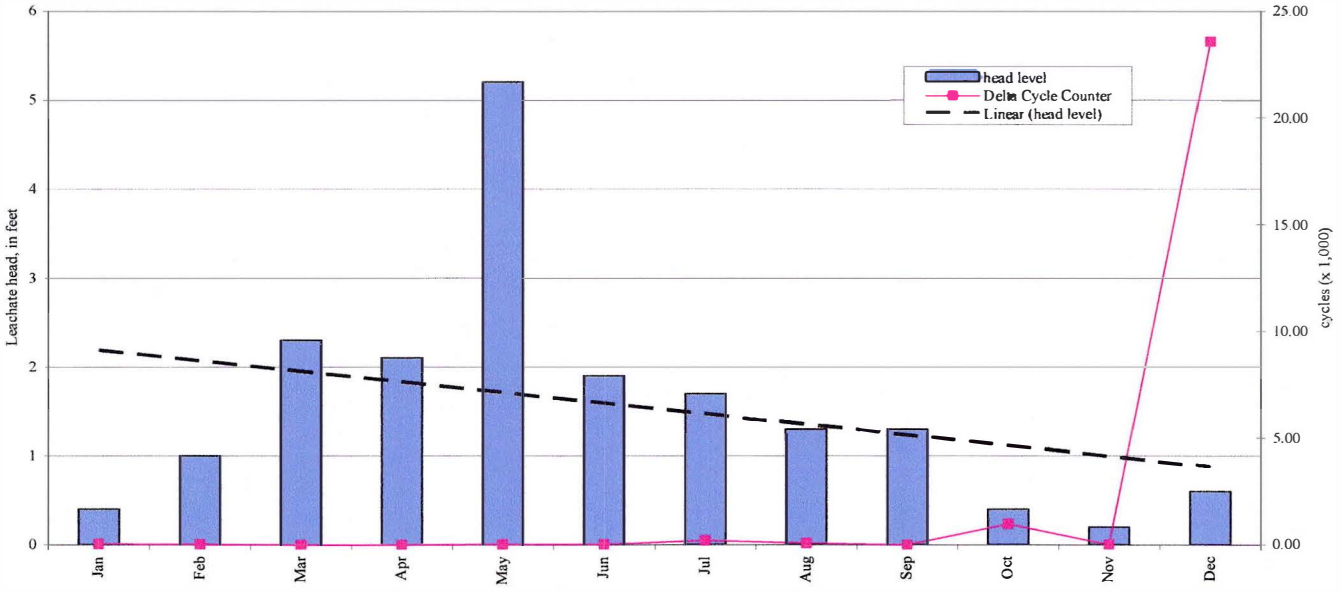



**Figure 4-14**
**GW-13 Monthly Leachate Levels and Pumping**




Based on our review of the monthly data, it does appear that leachate levels are increasing in the wells without a pump installed in them. That being said, it also appears that the wells with pumps in them are adequately controlling the leachate levels within those wells.

## V. CONCLUSIONS AND RECOMMENDATIONS

### A. Conclusions

The LFG and leachate collection systems at the Refuse Hideaway Landfill were operated continuously throughout calendar year 2001. Aside from routine services performed throughout the year, the major non-routine service performed at the site included the following:

- Mechanical and instrumentation upgrades were performed in September 2001 which has significantly improved the collection system runtime.

The leachate collection system had no major operational concerns throughout 2001. There is likelihood that some wells are exhibiting an increase in leachate levels, and consideration should be given to installing additional pneumatic pumps in said wells.

### B. Recommendations for 2002

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 2002, with alterations as necessary following any modifications made to the blower/flare station.