

TIER 2 SAMPLING AND ANALYSIS REPORT
FOR THE
CITY OF FLAGSTAFF'S CINDER LAKE LANDFILL
FLAGSTAFF, ARIZONA

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November 14, 2003
File No. 10203032.00

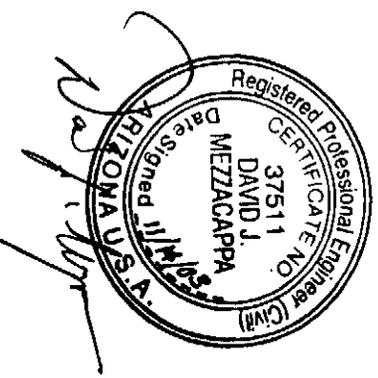


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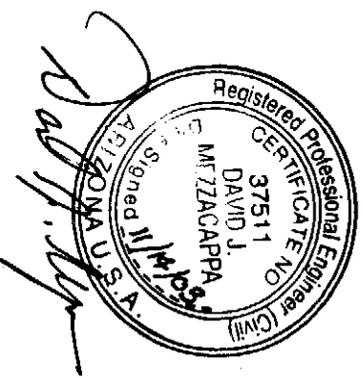
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1.0 EXECUTIVE SUMMARY

Tier 2 sampling of non-methane organic compound (NMOC) content in landfill gas at the City of Flagstaff's Cinder Lake Landfill was performed to determine if a gas collection and control system will be required under New Source Performance Standard (NSPS) requirements. This report documents the results of the Tier 2 sampling which was conducted October 13 through October 15, 2003. This report also serves to calculate NMOC emissions for the landfill from 2003 through 2008 (NSPS rules allow for the estimation of the NMOC emission rate for up to five years into the future).

The Cinder Lake Landfill's design capacity is in excess of the 2.5 million megagram (Mg) capacity threshold triggering the NSPS requirement to perform Tier 1 NMOC emission rate calculations. The City submitted a Tier 1 NMOC emission rate calculation in accordance with NSPS requirements and the NMOC emission rate was reported as being in excess of 50 Mg/year. This emission rate exceeds the NSPS threshold NMOC emission rate of 50 Mg/year which requires installation of a gas collection and control system (GCCS) if no Tier 2 sampling is performed.

The City performed Tier 2 sampling in 1997. This sampling and the subsequent report showed that, using site-specific NMOC data as allowed by the NSPS rule, the landfill's actual NMOC emission rate was under 50 Mg/yr. NSPS rules state that site-specific NMOC testing is only valid for five years. Therefore, Tier 2 sampling was performed again in 2002. However, the 2002 sampling yielded analytical results that were very high in Nitrogen and Oxygen indicating reduced sample quality. The City budgeted money to redo the sampling and analysis in 2003 in an effort to improve on the sample quality and thereby obtain more representative samples. The 2003 sampling and analysis effort was a great improvement to the 2002 effort with Nitrogen and Oxygen levels coming in at half of what they were in 2002. The 2003 results show an average NMOC concentration (C_{NMOC}) of 65.7 ppmv as hexane as opposed to the 4,000 ppmv default required in the Tier 1 NMOC emission rate calculation. The site-specific NMOC concentration of 65.7 ppmv determined by the Tier 2 testing and equations provided in the NSPS rules were used to re-calculate NMOC emissions.

Based on the calculated NMOC emission rates, the site is not required to control landfill gas at this time. Included in this report is the calculated NMOC emission rate for the years 2003 through 2008 as allowed by 40 CFR §60.757(b)(1)(ii). Based on the site-specific NMOC concentration of 65.7 ppmv and projected waste acceptance rates, NMOC emissions will remain below 50 Mg/yr through at least 2008 at which time the Tier 2 analysis will need to be re-performed (NSPS states that Tier 2 results are valid for up to five years).

2.0 INTRODUCTION

2.1 FACILITY DESCRIPTION AND HISTORY

The Cinder Lake Landfill is located approximately 8 miles northeast of Flagstaff, Arizona and is owned and operated by the City of Flagstaff. The initial permit for landfill operations at the site was issued by the USFS (Permit No. 53) on December 10, 1963. Based on information from the City, the site began receiving municipal solid waste (MSW) in 1965 in an area from which cinders were excavated for off-site uses.

The initial NSPS compliance documentation was conducted in 1997. During this assessment City files were reviewed to evaluate the amount of waste deposited since the landfill's opening. It was estimated that the landfill's design capacity was approximately 3.47 million Mg. This value exceeds the NSPS's 2.5 million Mg trigger for further action. The NSPS requires an estimate of landfill NMOC emission rates once the landfill's capacity is shown to be over the trigger threshold. Per NSPS requirements, a Tier 1 estimate of NMOC emissions was conducted. The conservative default values specified by the NSPS rule (4,000 ppmv) for this Tier 1 estimate showed NMOC emissions for the landfill to be well in excess of the 50 Mg/year trigger value for further action. At that point the City has the choice to either conduct site-specific testing (Tier 2) to refine the NMOC emission rate or design and install a landfill gas collection and control system.

Since the Tier 1 default values specified in the NSPS rules are very conservative the City elected to perform site-specific testing to refine the landfill's NMOC emission estimate. This testing, which was performed in 1997, showed that actual NMOC emissions from the landfill were under the 50 Mg/yr trigger level. Per NSPS rules, Tier 2 testing results are valid for 5 years so testing was performed again in 2002. The NMOC testing in 2002 again showed that the landfill's NMOC emission rate was under 50 Mg/year, however the analytical results all showed nitrogen in excess of 20% and most oxygen in excess of 5%. Since the 2002 samples had such excessive nitrogen and oxygen levels, the NMOC concentration values had to be corrected upwards to compensate causing an overly conservative NMOC content estimate.

Since the 2002 Tier 2 sampling effort encountered so many difficulties, the City included funds in its 2003 budget to re-perform the Tier 2 sampling in an effort to more carefully collect landfill gas samples and get a more accurate and representative site-specific NMOC content estimate. This goal was achieved with the average nitrogen and oxygen content at 19 and 3 percent, respectively. In 2002 the nitrogen and oxygen contents had been 40 and 6 percent, respectively. In other words, the nitrogen and oxygen content of the most recent sampling effort showed nitrogen and oxygen levels approximately half of what they were in the 2002 effort.

2.2 HISTORIC AND PROJECTED WASTE INTAKE VALUES

Table 1 shows the waste acceptance rates used in the calculation of NMOC emission rates for the Cinder Lake Landfill. The 1966 through 2001 values were taken from the landfill's prior Tier 2 report. The waste acceptance rates for all of 2002 and most of 2003 (through September) are from actual data. The balance of 2003 was estimated by assuming the same intake as the last three months of 2002 with a 5% increase added to those months. The estimated intake from 2004 through 2007

was estimated assuming an annual 8% increase. Based upon conversations with City staff this should be a conservative assumption. The NMOC emissions rate will be re-filed if it is determined that any actual waste quantities exceeded the estimated amounts between 2003 and 2007.

**TABLE 1
Cinder Lake Landfill - Waste Acceptance Rates**

Year	Waste Input (TONS/yr)	Year	Waste Input (TONS/yr)	Year	Waste Input (TONS/yr)
1965	14,275	1980	77,162	1995	139,994
1966	17361	1981	83,665	1996	149,914
1967	20,481	1982	90,059	1997	149,914
1968	23,667	1983	96,452	1998	149,914
1969	26,896	1984	103,066	1999	151,017
1970	30,148	1985	112,436	2000	149,914
1971	33,180	1986	147,710	2001	149,914
1972	36,266	1987	112,436	2002-	109,836
1973	39,353	1988	115,743	2003*	116,740
1974	42,329	1989	117,947	2004*	126,079
1975	45,636	1990	127,868	2005*	136,166
1976	51,809	1991	148,812	2006*	147,059
1977	48,171	1992	170,858	2007*	158,823
1978	74,406	1993	136,687		
1979	70,768	1994	117,947		

* All or partially estimated value.

2.3 PROJECT TEAM

Members of the project and contact information are as follows:

- City of Flagstaff: Mr. James A. Duffield, R.G., Environmental Specialist (928) 527-9843
- SCS Engineers: Mr. David J. Mezzacappa, P.E., Sr. Project Engineer (602) 840-2596
- ESN – Rocky Mountain (Sampling): Mr. John Fontana (303) 278-1911
- Air Technology Laboratories (Analysis): Mr. Mark Johnson (626) 964-4032

3.0 SAMPLING METHODOLOGY

EPA Method 25C sampling procedures were followed for the collection of Tier 2 samples at the City of Flagstaff's Cinder Lake Landfill. The NSPS rules require that two landfill gas samples per hectare be collected in areas with waste two years or older with the maximum number of samples being 50. The landfill has a large area of waste which has been in place for more than 2 years so the maximum number of samples (50) was taken. These samples were each physically extracted from below the landfill surface in accordance with EPA method 25C. All samples were logged in the field. The selected analytical laboratory (Advanced Technology Laboratories) provided canisters and Chain-Of-Custody forms for the sampling activities. Each canister could hold up to three landfill gas samples. Sampling locations are shown on Figure 1 at the end of this report prior to the appendices. Areas which had waste in place less than two years or which were not suitable for sampling are noted on the map.

3.1 SUMMARY OF SAMPLING PROCEDURE

The first activity performed in the sampling was to push a pilot probe to a depth of at least one meter below the bottom of the landfill cover. The pilot probe was then pulled out. Next, a stainless steel probe with the bottom third perforated was pushed into the pilot hole to a depth of at least one meter below the bottom of the landfill cover. After the probe was pushed into the pilot hole, a sampling cap was placed onto the top of the probe.

The sampling train was then connected to the probe cap. The sampling train consisted of a flow control valve, a purge pump, and a gas-meter. The sampling train was first purged at a rate of 500 milliliters (ml) per minute for five to six minutes. This process purges more than three sampling train volumes worth of gas. A gas-meter was then used to measure methane, carbon dioxide, and oxygen content. These values were recorded and used as an additional check to confirm that the sample was landfill gas with minimal air intrusion. The field data is included in Appendix B of this report for each sampling point.

Once it was determined that the field readings of oxygen, carbon dioxide and methane were good enough to warrant collecting a sample from that point the sample canister was opened. The canister was under a vacuum therefore no pumping was necessary. The flow was controlled so as not to exceed 500 ml/min as required in EPA Method 25C. As previously mentioned, up to three sample points were composited into one canister. An equivalent pressure drop was recorded for each sample to help ensure that equivalent sample volumes were composited into each canister. The overall process was repeated for each of the 50 sampling points.

4.0 ANALYTICAL RESULTS

Each gas sample was analyzed for carbon dioxide, methane, and NMOOC (following Method 25C), and for oxygen and nitrogen (following Method 3C). Carbon dioxide and methane were also measured in the 3C analysis. The results from the analyses are included in Appendix C.

Table 2 summarizes the analytical results. The NMOOC content (C_{NMOOC}) results were averaged to determine the site-specific C_{NMOOC} . Up to 5 sampling points may be composited into one analysis and no more than 3 samples can be contained in each canister. Therefore, each analysis generally consisted of a composite of two canisters; one will have contained two field sampling points and the other two field sampling points.

Sample points 46 through 50 were divided into two analyses because the lab reported that when compositing all five of these points the oxygen was above 5%. Since this was the only composite of five sample points where oxygen levels exceeded 5% SCS requested that the two canisters containing these five sample points be analyzed separately to provide more detail on the source of the high oxygen levels.

It should be noted that several of the sample results showed nitrogen content in excess of 20%. Method 25C does not typically allow for nitrogen contents above 20% as it often is a signal of air intrusion into the samples, however, SCS believes that these samples should be included as valid for the following reasons:

- 1) The natural ratio of oxygen to nitrogen in the air is 3.5:1. However, as shown in Table 2 all of the nitrogen to oxygen ratios are much higher than this. In fact, only one of the samples has an oxygen content in excess of 5%. These results indicate that the high nitrogen values are not necessarily a result of air intrusion.
- 2) Many of the sections sampled at this landfill were in excess of 20 years old and landfill gas generation may be waning in these areas. The bacteria that produce landfill gas may be using oxygen as opposed to nitrogen (aerobic). This would explain why there was less oxygen in the samples as opposed to nitrogen.
- 3) All results reported in Table 2 represent "corrected" values. Method 25C contains a method to correct for nitrogen values which effectively raises the NMOOC value.
- 4) An examination of Table 2 shows that there is very little difference in the NMOOC values for samples with nitrogen over or under 20%. Therefore, to assure a representative average for all areas of the landfill, all values were used to determine the average.
- 5) In prior Tier 2 sampling and analyses performed at this landfill many if not all samples yielded nitrogen values in excess of 20%. Therefore this landfill has a history of exhibiting gas samples with high nitrogen.

TABLE 2
Summary of Analytical Results

Sample Number from Analysis Location	CO ₂ (ppm)	Nitrogen Content (ppm)	Nitrogen Ratio	NO _x Content (ppm as Nitrogen)
1, 2, 3, 4, 5	ND <2.2	7.8	N/A	65
6, 7, 8, 9, 10	ND <2.4	5.4	N/A	99
11, 12, 13, 14, 15	3.7	14	3.8:1	68
16, 17, 18, 19, 20	1.9	24	12.6:1	72
21, 22, 23, 24, 25	4.5	26	5.8:1	52
26, 27, 28, 29, 30	4.1	29	7.1:1	60
31, 32, 33, 34, 35	ND <2.5	29	N/A	70
36, 37, 38, 39, 40	ND <2.2	26	N/A	62
41, 42, 43, 44, 45	ND <2.2	14	N/A	54
46, 47, 48	ND <1.9	9.2	N/A	57
49, 50	5.9	26	4.4:1	51
Site Specific C _{NMOC} (average individual NMOC contents) ²				65.7

¹ Reported values represent total NMOC content with a correction for Nitrogen content.

² Average is weighted since two of the results represented less than 5 sample points each.

Based upon the information presented, the site-specific C_{NMOC} of 65.7 is assumed as being representative of actual NMOC levels at the landfill. This value has therefore been used to calculate the site-specific NMOC emission rate.

5.0 DATA ANALYSIS AND CALCULATIONS

The site-specific C_{NMOC} value of 65.7 ppmv was used in the equation specified in 40 CFR 60.754(a)(1)(i) via a spreadsheet to calculate 2003 through 2008 NMOC emissions for the City of Flagstaff's Cinder Lake Landfill. Refer to section 2.2 of this report for a summary of waste quantities used in the calculation of the NMOC emission rate. The NMOC emission rate equation and the parameters used to estimate NMOC emissions are shown below:

40 CFR 60.754(a)(1)(i). (For landfills where the annual acceptance rate is known)

$$M_{NMOC} = \sum_{i=1}^n 2 K L_o M_i (e^{-kt_i}) (C_{NMOC}) (3.6 \times 10^{-9})$$

Where:

M_{NMOC} =	Total mass emission rate of NMOC from the landfill, Mg/yr	
L_o =	Refuse methane generation potential* =	170 (m ³ /Mg)
M_i =	Mass of waste in the i th section	See Section 2.2 (Mg)
k =	Methane generation rate constant for arid sites* =	0.02 (1/yr)
t_i =	Age of the i th section =	varies (yrs)
C_{NMOC} =	Concentration of NMOC** =	65.7 (ppmv as hexane)
3.6×10^{-9} =	Conversion factor	
n =	Number of sections accepting MSW =	varies (equal to t_i but unitless)

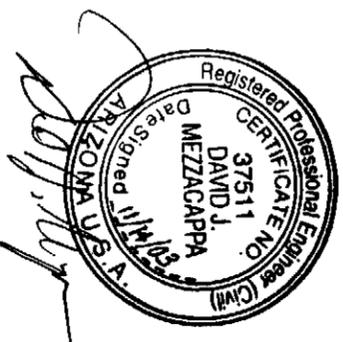
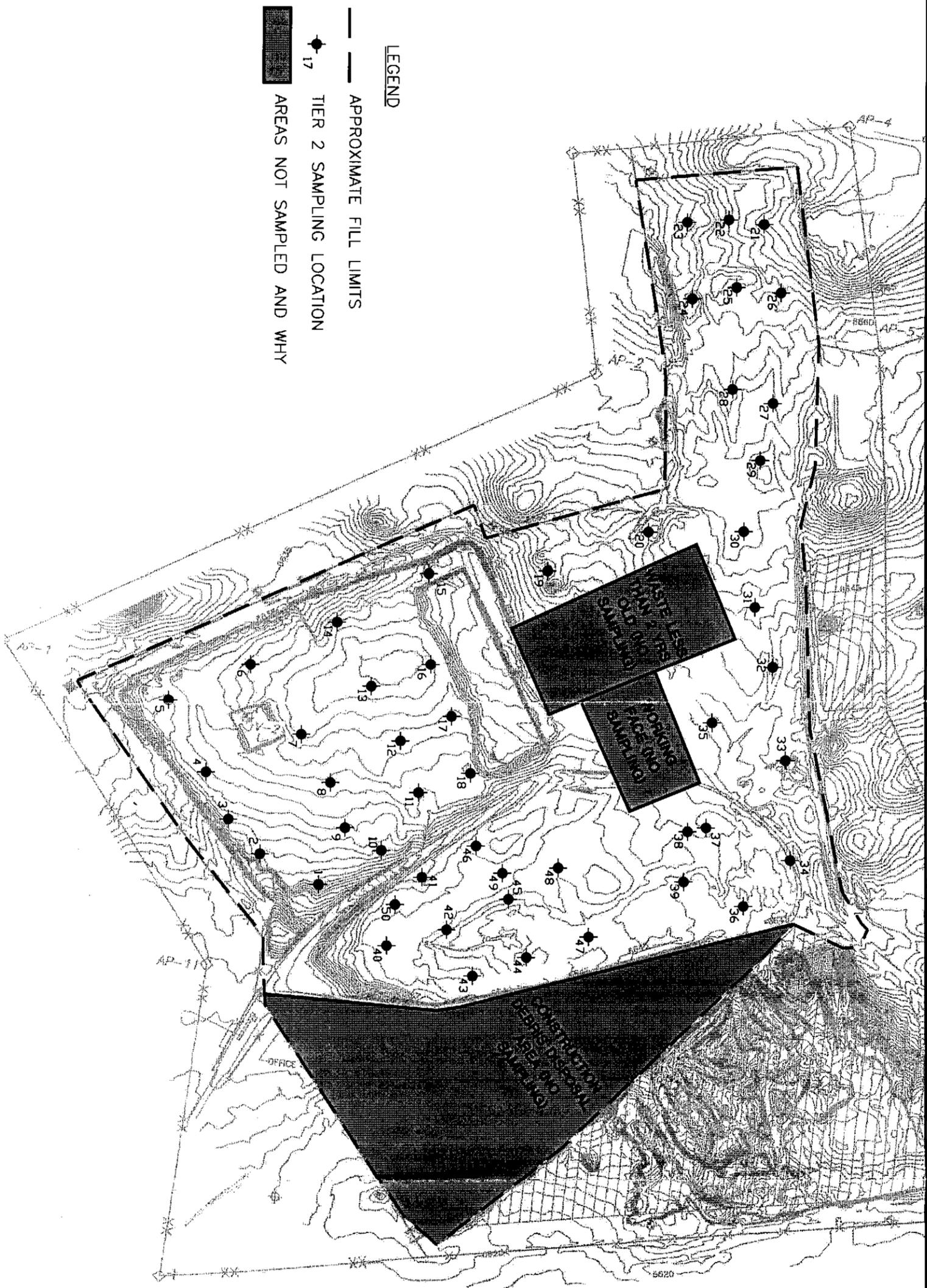
$$Q_i = 2 (0.02) (170) (M_i) (e^{-0.02t_i}) (65.7) (3.6 \times 10^{-9})$$

2003 M_{NMOC} = 4.0 Mg/yr	2004 M_{NMOC} = 4.1 Mg/yr	2005 M_{NMOC} = 4.2 Mg/yr
2006 M_{NMOC} = 4.3 Mg/yr	2007 M_{NMOC} = 4.4 Mg/yr	2008 M_{NMOC} = 4.5 Mg/yr

* Default value for sites with less than 25 inches/yr of precipitation

** Cinder Lake Site-Specific average value

The spreadsheet used for these calculations is included in Appendix A. Based on this result, NSPS gas collection and control requirements do not apply as the landfill's NMOC emissions are well under 50 Mg/yr.



SCS ENGINEERS
 "Superior Customer Service"

Tier 2 Sample Locations
Cinder Lake Landfill
Flagstaff, Arizona

Project Number:
 10.203032.00
 Scale: 1" = 400'
 Figure 1

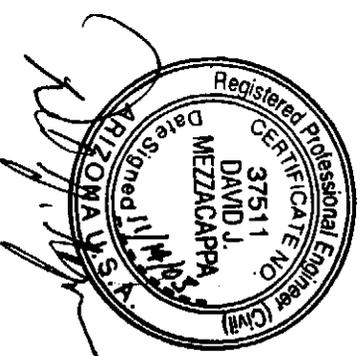
**APPENDIX A
NMOE Emission Calculations**

TABLE 1. PROJECTED LFG AND NMOC GENERATION RATES
CINDER LAKE LANDFILL, FLAGSTAFF, AZ

Year	Disposal Rate (tons/yr)	Refuse In-Place (tons)	Disposal Rate (Mg/yr)	Refuse In-Place (Mg)	Methane Generation Rates (m ³ /yr)	LFG Generation Rates (cfm)	LFG Generation Rates (Million ft ³ /yr)	NMOC Generation Rates (tons/yr)	NMOC Generation Rates (Mg/yr)
1965	14,725	0	13,358	0	0.000E+00	0	0	0.0	0.0
1966	17,361	14,725	15,750	13,358	4.542E+04	6	3	0.0	0.0
1967	20,481	32,086	18,580	29,108	9.807E+04	13	7	0.1	0.0
1968	23,667	52,567	21,470	47,688	1.593E+05	21	11	0.1	0.1
1969	26,896	76,234	24,400	69,158	2.291E+05	31	16	0.1	0.1
1970	30,148	103,130	27,350	93,558	3.076E+05	41	22	0.2	0.1
1971	33,180	133,278	30,100	120,908	3.945E+05	53	28	0.2	0.2
1972	36,266	166,458	32,900	151,008	4.890E+05	66	35	0.3	0.2
1973	39,353	202,724	35,700	183,908	5.912E+05	79	42	0.3	0.3
1974	42,329	242,077	38,400	219,609	7.008E+05	94	50	0.4	0.3
1975	45,636	284,406	41,400	258,009	8.175E+05	110	58	0.4	0.4
1976	51,809	330,042	47,000	299,409	9.421E+05	127	67	0.5	0.4
1977	48,171	381,831	43,700	346,409	1.083E+06	146	77	0.6	0.5
1978	74,406	430,022	67,500	390,109	1.210E+06	163	85	0.6	0.6
1979	70,768	504,428	64,200	457,609	1.416E+06	190	100	0.7	0.7
1980	77,162	575,196	70,000	521,809	1.606E+06	216	113	0.8	0.8
1981	83,665	652,358	75,900	591,809	1.812E+06	244	128	0.9	0.9
1982	90,059	736,023	81,700	667,709	2.035E+06	273	144	1.1	1.0
1983	96,452	826,082	87,500	749,409	2.272E+06	305	160	1.2	1.1
1984	103,066	922,534	93,500	836,909	2.525E+06	339	178	1.3	1.2
1985	112,436	1,025,600	102,000	930,409	2.792E+06	375	197	1.4	1.3
1986	147,710	1,138,036	134,000	1,032,409	3.084E+06	414	218	1.6	1.5
1987	112,436	1,285,746	102,000	1,166,409	3.478E+06	467	246	1.8	1.6
1988	115,743	1,398,182	105,000	1,268,409	3.756E+06	505	265	2.0	1.8
1989	117,947	1,513,925	107,000	1,373,410	4.039E+06	543	285	2.1	1.9
1990	127,868	1,631,872	116,000	1,480,409	4.323E+06	581	305	2.2	2.0
1991	148,812	1,759,740	135,000	1,596,409	4.632E+06	622	327	2.4	2.2
1992	170,858	1,908,552	155,000	1,731,409	4.999E+06	672	353	2.6	2.4
1993	136,687	2,079,410	124,000	1,886,409	5.427E+06	729	383	2.8	2.6
1994	117,947	2,216,097	107,000	2,010,409	5.741E+06	771	405	3.0	2.7
1995	139,994	2,334,044	127,000	2,117,409	5.991E+06	805	423	3.1	2.8
1996	149,914	2,474,038	136,000	2,244,410	6.304E+06	847	445	3.3	3.0
1997	149,914	2,623,952	136,000	2,380,409	6.642E+06	893	469	3.4	3.1
1998	149,914	2,773,866	136,000	2,516,409	7.297E+06	937	492	3.6	3.3
1999	151,017	2,923,780	137,000	2,652,409	7.930E+06	981	515	3.8	3.4
2000	149,914	3,074,797	136,000	2,789,409	7.618E+06	1,024	538	4.0	3.6
2001	149,914	3,224,711	136,000	2,925,409	7.930E+06	1,066	560	4.1	3.7
2002	109,836	3,374,625	99,642	3,061,408	8.235E+06	1,107	582	4.3	3.9
2003	116,740	3,484,461	105,905	3,161,050	8.411E+06	1,130	594	4.4	4.0
2004	126,079	3,601,201	114,377	3,266,955	8.605E+06	1,156	608	4.5	4.1
2005	136,166	3,727,280	123,528	3,381,332	8.823E+06	1,186	623	4.6	4.2
2006	147,059	3,863,446	133,410	3,504,859	9.068E+06	1,219	640	4.7	4.3
2007	158,823	4,010,505	144,082	3,638,269	9.342E+06	1,255	660	4.9	4.4
2008	-	4,169,328	-	3,782,351	9.647E+06	1,296	681	5.0	4.5

ESTIMATED NMOC CONCENTRATION IN LFG:
 ASSUMED METHANE CONTENT OF LFG:
 SELECTED DECAY RATE CONSTANT:
 SELECTED ULTIMATE METHANE RECOVERY RATE:
 METRIC EQUIVALENT:

65.7 ppmv
 50%
 0.02
 5.446 ft³/ton
 170 cu m/Mg



**APPENDIX B
Field Data**

Table B-1
Summary of Field Data ¹

Sample ID	Container ID	Date Sampled	Time Sampled	Methane Concentration (%)	Carbon Dioxide (%)	Trace Gases (%)
1	5957	10/13/03	10:00 A.M.	52.9	43.1	0.0
2	5957	10/13/03	10:20 A.M.	51.2	43.0	0.0
3	5957	10/13/03	10:40 A.M.	51.7	44.3	0.0
4	9703B	10/13/03	11:15 A.M.	50.6	44.4	0.0
5	9703B	10/13/03	11:30 A.M.	49.4	45.8	0.0
6	1467	10/13/03	12:30 P.M.	50.5	44.7	0.0
7	1467	10/13/03	12:45 P.M.	51.5	42.7	0.1
8	1467	10/13/03	1:00 P.M.	50.7	43.0	0.0
9	1444	10/13/03	1:20 P.M.	50.3	44.5	0.0
10	1444	10/13/03	1:40 P.M.	48.4	47.5	0.0
11	5226	10/13/03	2:00 P.M.	47.7	46.9	0.0
12	5226	10/13/03	2:20 P.M.	49.2	45.8	0.0
13	5226	10/13/03	2:40 P.M.	50.1	45.0	0.0
14	1359	10/13/03	3:00 P.M.	49.3	45.7	0.0
15	1359	10/13/03	3:15 P.M.	47.5	46.4	0.1
16	02423	10/13/03	3:40 P.M.	50.0	45.4	0.0
17	02423	10/13/03	4:00 P.M.	49.9	44.8	0.1
18	02423	10/13/03	4:15 P.M.	48.4	46.0	0.0
19	1425	10/13/03	4:40 P.M.	10.9	22.1	0.6
20	1425	10/13/03	4:55 P.M.	19.3	25.1	0.0
21	4439	10/14/03	9:00 A.M.	46.9	39.7	3.2
22	4439	10/14/03	9:30 A.M.	27.4	29.4	1.2
23	4439	10/14/03	10:00 A.M.	49.4	35.0	0.9
24	1290	10/14/03	10:20 A.M.	52.3	34.7	0.2
25	1290	10/14/03	10:40 A.M.	47.7	38.9	0.6
26	1389	10/14/03	11:00 A.M.	17.4	27.5	0.6
27	1389	10/14/03	11:20 A.M.	37.8	33.3	0.7

Table B-1 (Continued)

Sample ID	Container ID	Date Sampled	Time Sampled	Methane Content (%)	Carbon Dioxide (%)	Hydrogen Sulfide (%)
28	1389	10/14/03	1:10 P.M.	51.0	37.8	0.4
29	1395	10/14/03	1:25 P.M.	46.4	38.0	3.1
30	1395	10/14/03	2:00 P.M.	49.7	41.5	0.9
31	02415	10/14/03	2:20 P.M.	31.9	34.8	0.9
32	02415	10/14/03	2:40 P.M.	27.6	30.4	0.9
33	02415	10/14/03	3:00 P.M.	49.8	41.5	0.9
34	1367	10/14/03	3:20 P.M.	31.1	29.7	0.9
35	1367	10/14/03	3:40 P.M.	47.8	40.5	0.9
36	1355	10/14/03	4:00 P.M.	35.7	30.0	0.7
37	1355	10/14/03	4:20 P.M.	30.7	31.5	0.7
38	1355	10/14/03	4:40 P.M.	41.9	36.0	0.7
39	1380	10/14/03	5:00 P.M.	35.4	31.6	0.7
40	1380	10/15/03	8:50 A.M.	46.7	36.4	0.0
41	5968	10/15/03	9:00 A.M.	51.7	40.2	0.0
42	5968	10/15/03	9:20 A.M.	52.9	42.0	0.0
43	5968	10/15/03	9:40 A.M.	48.8	40.8	0.0
44	6018	10/15/03	10:40 A.M.	32.9	30.5	0.0
45	6018	10/15/03	11:00 A.M.	49.5	39.9	0.0
46	6061	10/15/03	11:30 A.M.	41.5	33.4	0.2
47	6061	10/15/03	11:50 A.M.	50.0	39.4	0.0
48	6061	10/15/03	12:50 P.M.	52.0	40.6	0.4
49	02420	10/15/03	1:20 P.M.	46.5	37.5	0.2
50	02420	10/15/03	1:30 P.M.	51.5	39.7	0.5

**APPENDIX C
Laboratory Analysis Results**

10/31/2003

SCS Engineers
ATTN: David Mezzacappa
2702 N. 44th St., Suite 105B
Phoenix, AZ 85008-1583

Project Reference: Cinder Lake Tier II
Lab Number: A3102002-01/20

Enclosed are results for sample(s) received 10/20/03 by Air Technology Laboratories. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

Sample analyses were performed within method performance criteria.
All results are reported without qualifications.

Results were faxed to David Mezzacappa on 10/28/03.

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,



Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Enclosures

Note: The cover letter is an integral part of this analytical report.



Air Technology
Laboratories

18501 E. Gale Avenue Suite 130 City of Industry, CA 91748 Tel: 626 964-4032 Fax: 626 964-5832

CHAIN OF CUSTODY RECORD



**Air Technology
Laboratories**

18501 E. Gale Avenue, Suite 130
City of Industry, CA 91748
626-964-4032 • Fax: 626-964-5832

Project Name: CINDER LAKE TIER II
Project #:
P.O. #:

FOR LABORATORY USE ONLY

Method of Transport
Walk-in
Courier
UPS
FedEx
ATL

Sample Condition Upon Receipt

1. CHILLED N 4. SEALED N
2. HEADSPACE (VOA) N 5. # OF SPLS MATCH COC N
3. CONTAINER INTACT N 6. PRESERVED N

Company: SCS ENGINEERS
Contact: DAVID MEZZACAPPA

Address: 2702 N. 44TH ST SUITE 105 B
City: PHOENIX State: AZ Zip Code: 85008

TEL: (602) 840-2596
FAX: ()

Relinquished by: (Signature and Printed Name) <u>Thomas A. Courtright</u>	Date: <u>10-15-03</u>	Time: <u>14:20</u>	Received by: (Signature and Printed Name) <u>JARCO</u>	Date:	Time:
Relinquished by: (Signature and Printed Name) <u>Fed Ex</u>	Date: <u>10/20/03</u>	Time: <u>0950</u>	Received by: (Signature and Printed Name) <u>JARCO</u>	Date: <u>10/20/03</u>	Time: <u>0850</u>

I hereby authorize ATL to perform the work indicated below:

Thomas A. Courtright 10-15-03
Project Mgr./Submitter (Print Name) Date
Thomas A. Courtright
Signature

Send Report To:
Attn: DAVID MEZZACAPPA
Co: SCS ENGINEERS
Address 2702 N 44TH ST, SUITE 105B
City PHOENIX State AZ Zip 85008

Bill To:
Attn:
Co:
Address:
City: State: Zip:

Special Instructions/Comments:
* Instructions per D. Mezzacappa 10/24/03

Unless otherwise requested, all samples will be disposed 14 days after reporting or at Lab's discretion.
Sample Archive/Disposal:
 Laboratory Standard
 Other
 Return To:
*** \$10.00 FEE PER HAZARDOUS SAMPLE DISPOSAL.**

Circle or Add Analysis(es) Requested	CIRCLE APPROPRIATE MATRIX												PRESERVATION	QA/QC						
	CONTAINER(S)																			
	TAT # Type																			
T03 Gas / BTEX / MTBE	T03 Hexane	T03 Carbon Chain	T014A Volatiles	T015 Volatiles Std/Low Level	15/16 Sulfur Comp Std/Low Level	15/16 H ₂ S Std/Low Level	250/30C Fixed Gas	25.1 TGM/MHC	D1945 Natural Gas	RSK 175 Dissolved Gas	AIR • VAPOR	INDOOR AIR	LANDFILL GAS	WATER	SOLID • SOIL	OIL • SOLVENT • LIQUID	OTHER	RTNE <input type="checkbox"/>	RWQCB <input type="checkbox"/>	SPECIAL <input type="checkbox"/>

LAB USE ONLY	Sample Description			
Lab No.	Sample I.D.	Date	Time	
<u>A3102002-01</u>	<u>5957 - #'s 1,2,3</u>	<u>10-13</u>	<u>1040</u>	<u>composite</u>
	<u>Q 97038 - #'s 4,5</u>		<u>1130</u>	
	<u>03 1467 - #'s 6,7,8</u>		<u>1300</u>	<u>composite</u>
	<u>04 1444 - #'s 9,10</u>		<u>1340</u>	
	<u>05 5226 - #'s 11,12,13</u>		<u>1440</u>	<u>composite</u>
	<u>06 1359 - #'s 14,15</u>		<u>1515</u>	
	<u>07 02423 - #'s 16,17,18</u>		<u>1615</u>	<u>composite</u>
	<u>08 1425 - #'s 19,20</u>		<u>1655</u>	
	<u>09 4439 - #'s 21,22,23</u>	<u>10-14</u>	<u>1000</u>	<u>composite</u>
	<u>10 1290 - #'s 24,25</u>	<u>10-14</u>	<u>1040</u>	

• TAT starts 8 a.m. following day if samples received after 5 p.m.
TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays
Preservatives: H=Hcl N=None
Container Types: B=Tedlar Bag C=Canister V=VOA O=Other

CHAIN OF CUSTODY RECORD



**Air Technology
Laboratories**

18501 E. Gale Avenue, Suite 130
City of Industry, CA 91748
626-964-4032 • Fax: 626-964-5832

Project Name: CINDER LAKE TIER II
Project #:
P.O. #:

FOR LABORATORY USE ONLY

Method of Transport
Walk-in
Courier
UPS
FedEx
ATL

Sample Condition Upon Receipt
1. CHILLED Y N 4. SEALED Y N
2. HEADSPACE (VOA) Y N 5. # OF SPLS MATCH COC Y N
3. CONTAINER INTACT Y N 6. PRESERVED Y N

Company: SCS ENGINEERS Address: 2702 N. 44th St Suite 105 B TEL: (602) 840-2596
Contact: DAVID MEZZACAPPA City: PHOENIX State: AZ Zip Code: 85008 FAX: ()

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Thomas A. Courtright 10-15-03 1420 Received by: JARCO Paul ATL
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
FedEx 10/20/03 0850 Received by: JARCO Paul ATL 10/20/03 0850
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
THOMAS A. COURTRIGHT 10-15-03
Project Mgr./Submitter (Print Name) Date
Thomas A. Courtright
Signature

Send Report To:
Attn: DAVID MEZZACAPPA
Co: SCS ENGINEERS
Address 2702 N. 44th St. Suite 105B
City PHOENIX State AZ Zip 85008

Bill To:
Attn:
Co:
Address:
City: State: Zip:

Special Instructions/Comments:
* Instructions per D. Mezzacappa 10/20/03

Unless otherwise requested, all samples will be disposed 14 days after reporting or at Lab's discretion.
Sample Archive/Disposal:
 Laboratory Standard
 Other
 Return To:
* \$10.00 FEE PER HAZARDOUS SAMPLE DISPOSAL.

Circle or Add Analysis(es) Requested	CIRCLE APPROPRIATE MATRIX			PRESERVATION	Q A / Q C
	TAT	#	Type		
T03 Gas / BTEX / MTBE					
T03 Hexane					
T03 Carbon Chain					
T015 Volatiles					
13/16 Volatiles Std/Low Level					
15/16 Sulfur Comp Std/Low Level					
30/D1946 Std/Low Level					
25C/2C Fixed Gas					
25-1 TGM/MHC					
D1945 Natural Gas					
RSK 175 Dissolved Gas					
AIR - VAPOR					
INDOOR AIR					
LANDFILL GAS					
WATER					
SOLID - SOIL					
OIL - SOLVENT - LIQUID					
OTHER					

LAB USE ONLY		Sample Description	
Lab No.	Sample I.D.	Date	Time
<u>VB102002-1</u>	<u>1389 - #'s 26, 27, 28</u>	<u>10-14</u>	<u>1310</u>
<u>12</u>	<u>1395 - #'s 29, 30</u>		<u>1400</u>
<u>13</u>	<u>02415 - #'s 31, 32, 33</u>		<u>1500</u>
<u>14</u>	<u>1367 - #'s 34, 35</u>		<u>1540</u>
<u>15</u>	<u>1355 - #'s 36, 37, 38</u>		<u>1640</u>
<u>16</u>	<u>1380 - #'s 39, 40</u>	<u>10-15</u>	<u>0850</u>
<u>17</u>	<u>5968 - #'s 41, 42, 43</u>		<u>0940</u>
<u>18</u>	<u>6018 - #'s 44, 45</u>		<u>1100</u>
<u>19</u>	<u>6061 - #'s 46, 47, 48</u>		<u>1250</u>
<u>20</u>	<u>02420 - #'s 49, 50</u>		<u>1340</u>

• TAT starts 8 a.m. following day if samples received after 5 p.m.
TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays
Container Types: B=Tedlar Bag C=Canister V=VOA O= Other
Preservatives: H=Hcl N=None

Client: SCS Engineers
Attn: David Mezzacappa

Project Name: Cinder Lake Tier II
Project Number: NA
Date Received: 10/20/2003
Matrix: Vapor

TNMOC by EPA METHOD 25C
Fixed Gases by EPA METHOD 3C

Lab Number:	A3102002-01,02	A3102002-03,04	A3102002-05,06	A3102002-07,08	A3102002-09,10							
Client Sample ID:	5957-#s 1,2,3 9703B-#s 4,5	1467-#s 6,7,8 1444-#s 9,10	5226-#s 11,12,13 1359-#s 14,15	02423-#s 16,17,18 1425-#s 19,20	4439-#s 21,22,23 1290-#s 24,25							
Date Collected:	10/13/2003	10/13/2003	10/13/2003	10/13/2003	10/14/2003							
Date Analyzed:	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003							
Analyst Initials:	DT	DT	DT	DT	DT							
QC Batch:	031022GCC8A1	031022GCC8A1	031022GCC8A1	031022GCC8A1	031022GCC8A1							
Dilution Factor:	4.4	4.8	3.9	3.9	4.1							
ANALYTE	Units	PQL	Result	RL	Result	RL	Result	RL	Result	RL		
TNMOC	ppmv Hexane	1.7	65	7.3	99	8.0	68	6.5	72	6.5	52	6.9
TNMOC uncorr*	ppmv Hexane	1.7	62	7.3	94	8.0	63	6.5	64	6.5	46	6.9
TNMOC	ppmv C	10	392	44	591	48	410	39	432	39	309	41
TNMOC uncorr*	ppmv C	10	371	44	565	48	379	39	386	39	276	41
Nitrogen	%	1.0	7.8	4.4	5.4	4.8	14	3.9	24	3.9	26	4.1
Oxygen	%	0.50	ND	2.2	ND	2.4	3.7	1.9	ND	1.9	4.5	2.1

ND = Not detected at or above reporting limit.

PQL = Practical Quantitation Limit.

TNMOC = Total Non-Methane Organic Carbon.

TNMOC uncorr* = TNMOC concentration in sample without nitrogen/moisture correction.

NA = Nitrogen/moisture correction causes division by zero.

Reviewed/Approved By:



Mark Johnson

Air Toxics Operations Manager

Date:

10-31-03

The cover letter is an integral part of this analytical report.



Air Technology
Laboratories

18501 E. Gale Avenue Suite 130 City of Industry, CA 91748 Tel: 626 964-4032 Fax: 626 964-5832

Client: SCS Engineers
Attn: David Mezzacappa

Project Name: Cinder Lake Tier II
Project Number: NA
Date Received: 10/20/2003
Matrix: Vapor

TNMOC by EPA METHOD 25C
Fixed Gases by EPA METHOD 3C

Lab Number:	A3102002-11,12	A3102002-13,14	A3102002-15,16	A3102002-17,18						
Client Sample ID:	1389- #s 26,27,28 1395- #s 29,30	02415- #s 31,32,33 1367- #s 34,35	1355- #s 36,37,38 1380- #s 39,40	5968- #s 41,42,43 6018- #s 44,45						
Date Collected:	10/14/2003	10/14/2003	10/14-15/2003	10/15/2003						
Date Analyzed:	10/22/2003	10/22/2003	10/22/2003	10/22/2003						
Analyst Initials:	DT	DT	DT	DT						
QC Batch:	031022GC8A1	031022GC8A1	031022GC8A1	031022GC8A1						
Dilution Factor:	4.4	5.1	4.5	4.4						
ANALYTE	Units	PQL	Result	RL	Result	RL				
TNMOC	ppmv Hexane	1.7	60	7.3	70	8.4	62	7.5	54	7.3
TNMOC uncorr*	ppmv Hexane	1.7	53	7.3	63	8.4	56	7.5	50	7.3
TNMOC	ppmv C	10	359	44	420	51	371	45	322	44
TNMOC uncorr*	ppmv C	10	319	44	378	51	333	45	299	44
Nitrogen	%	1.0	29	4.4	29	5.1	26	4.5	14	4.4
Oxygen	%	0.50	4.1	2.2	ND	2.5	ND	2.2	ND	2.2

ND = Not detected at or above reporting limit.
PQL = Practical Quantitation Limit.
TNMOC = Total Non-Methane Organic Carbon.
TNMOC uncorr* = TNMOC concentration in sample without nitrogen/moisture correction.
NA = Nitrogen/moisture correction causes division by zero.

Reviewed/Approved By: 
Mark Johnson
Air Toxics Operations Manager

Date: 10-31-03

The cover letter is an integral part of this analytical report.



Air Technology
Laboratories

18501 E. Gale Avenue Suite 130 City of Industry, CA 91748 Tel: 626 964 4032 Fax: 626 964-5832

Client: SCS Engineers
Attn: David Mezzacappa

Project Name: Cinder Lake Tier II
Project Number: NA
Date Received: 10/20/2003
Matrix: Vapor

TNMOC by EPA METHOD 25C
Fixed Gases by EPA METHOD 3C

Lab Number:	A3102002-19	A3102002-20							
Client Sample ID:	6061-#s 46,47,48	02420-#s 49,50							
Date Collected:	10/15/2003	10/15/2003							
Date Analyzed:	10/24/2003	10/24/2003							
Analyst Initials:	DT	DT							
QC Batch:	031024GCRA1	031024GCRA1							
Dilution Factor:	3.9	6.3							
ANALYTE	Units	PQL	Result	RL	Result	RL			
TNMOC	ppmv Hexane	1.7	57	6.5	51	11			
TNMOC uncorr*	ppmv Hexane	1.7	54	6.5	47	11			
TNMOC	ppmv C	10	342	39	305	63			
TNMOC uncorr*	ppmv C	10	322	39	281	63			
Nitrogen	%	1.0	9.2	3.9	26	6.3			
Oxygen	%	0.50	ND	1.9	5.9	3.2			

ND = Not detected at or above reporting limit.
PQL = Practical Quantitation Limit.
TNMOC = Total Non-Methane Organic Carbon.
TNMOC uncorr* = TNMOC concentration in sample without nitrogen/moisture correction.
NA = Nitrogen/moisture correction causes division by zero.

Reviewed/Approved By:  Date: 10-31-03
Mark Johnson
Air Toxics Operations Manager

The cover letter is an integral part of this analytical report.



Air Technology
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