PROJECT NUMBER: 20-110-13

2009 AIR EMISSIONS INVENTORY FOR CINDER LAKE LANDFILL REVISED

June, 30 2010

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Figures and Tables

I. INTRODUCTION AND FACILITY INFORMATION

The Arizona Administrative Code (AAC), Title 18, Chapter 2, Section 327 (R18-2-327) requires that any facility emitting over one ton of a single regulated pollutant or two and a half tons of any combination of regulated pollutants report their air emissions to the Arizona Department of Environmental Quality's (ADEQ) Air Quality Division. This report contains the 2009 Air Emissions Inventory for the City of Flagstaff's Cinder Lake Landfill (CLL). This report also documents the collection of emissions data and the calculation of the estimated emissions generated at CLL in 2009.

A. FACILITY DESCRIPTION

The CLL is located approximately 8 miles northeast of Flagstaff, Arizona on land purchased from the United States Forest Service (USFS) in March 1999. A location map and a facility site map are included in Appendix A. The total design capacity of CLL is approximately 15.2 million short tons (as indicated in Woodward-Clyde Consultants' report titled, "Title V Permit Application for Cinder Lake Landfill," dated March 30, 1998). CLL accepts household, commercial, and institutional wastes, as well as animal carcasses and remains. CLL also accepts paper sludge from SCA Tissue, which is stockpiled, mixed with shredded green waste, and used as Alternate Daily Cover (ADC). The compacted solid waste cells are covered by a 6-inch thick intermediate layer of earthen cover and 8 to 12 inches of Alternate Daily Cover (ADC) over the working face at the end of each working day.

B. OPERATING INFORMATION

CLL operates from 7 AM to 4:45 PM Monday through Friday, 7 AM to 4:15 PM on Saturdays, and 9:30 AM to 4:15 PM on Sundays. The landfill is open 363 days per year. Landfill attendants are stationed at the scale house when the landfill is open to the public. The following are the personnel positions at the landfill:

- One Landfill Engineer
- One Landfill Manager
- One Operations Manager
- One Environmental Compliance Project Manager
- Three scale house attendants (1 full time, 2 part time)
- Four landfill equipment operators
- One solid waste service worker

C. EQUIPMENT LIST

The following equipment was in use during 2009 at CLL:

- Tub Grinder
- Three 1/2 Ton Pick-up Trucks
- One ¾ Ton Pick-up Trucks
- 14 CY Dump Truck
- 1998 826G Compactor
- 2004 826C Compactor
- Water Truck
- 627.E Scraper Auger
- D8-R Dozer
- Motor Grader
- 5 CY Loader
- 580 K Backhoe

A data sheet of the vehicles operating at CLL is included in Appendix B, Table 2.

D. AIR POLLUTION CONTROL INFORMATION

Dust control is accomplished by spraying heavy-traffic areas with non-potable water. Roads are also maintained regularly, while vehicle speeds are posted at 10 miles per hour. A landfill gas extraction system is not required at this time since the NMOC emission rate at CLL has not exceeded 50 Mg/yr.

II EMISSIONS INVENTORY PROCESS

A. OPERATIONAL FLOW DIAGRAM AND PROCESSES

An operation flow diagram is located in Appendix B, Figure 3. The operation and process table is located in Appendix B, Table 1 and the listing of equipment is located in Appendix B, Table 2.

B. METHODS FOR EMISSIONS CALCULATIONS

The fugitive dust emissions at CLL were estimated by using the methodology described in the EPA AP-42 Chapter 13.2.2 for the unpaved roads, and Chapter 13.2.4 for the aggregate handling and storage piles. EPA AP-42 Chapter 2.4, was used for the estimation of non-methane organic compounds (NMOCs), Volatile Organic Compounds (VOCs), and Hazardous Air Pollutants (HAPs) emissions. The emissions were entered into the i-STEPS infinity database and summarized by the program. The i-STEPS reports are located in Appendix F.

1. Particulate Emissions from Unpaved Roads

The particulate emissions were determined by calculating the emission factors for $PM_{2.5}$, PM_{10}, and Total Suspended Particulate (TSP) using the equation, constants, and tables from AP-42, Chapter 13.2.2 for unpaved road travel along with site-specific data and then multiplied by the vehicle miles traveled (VMT). This required the entry of the number of vehicle miles traveled in 2009 at the CLL. Estimating the length of road used for each landfill operation and multiplying that mileage by the number of vehicles using the road per day determined this number. This number was then converted to the number of miles traveled in 2009.

The following formula was used to calculate $PM_{2.5}$, PM_{10}, and TSP emissions factors:

$$E = [k(s/12)^a(w/3)^b] / (M/0.2)^c .$$

- a, b, c, and k are all constants determined by the size of the particulate. Values for a, b, c, and k obtained from AP-42, Chapter 13, Table 13.2.2-2.
- s (silt content) = 6.4% (value obtained from AP-42, Chapter 13, Table 13.2.2-1)
- w (weight of vehicle) = Mean weight based on % miles traveled.
- M (moisture content) = 0.2%

The emission factors were multiplied by the VMT per year and converted to tons per year.

2. Aggregate Handling and Storage Pile Emissions

The particulate emissions from storage piles at the CLL were calculated using the method specified in EPA AP-42 Chapter 13.2.4.

$$E = k(0.0032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

- E=Emission Factor (lb/ton)
- K= Particle Size Multiplier (dimensionless)
- U=Mean Wind Speed, (Miles Per Hour [mph])
- M=Material Moisture Content

The method requires the estimation of the volume of cover used at CLL during 2009, the particle size, wind speed, and moisture content.

3. NMOC Emissions

The NMOC emission rate was calculated using the equation specified in 40 CFR part 60.745(a)(1)(ii). The equation requires the entry of the average annual acceptance rate, methane generation rate (k), methane generation potential (L_o), years since closure, age of the landfill, and the NMOC concentration expressed as ppm as hexane, the methane generation rate, and the methane generation potential.

The estimation of the annual refuse acceptance rate was done using refuse acceptance data from Woodward-Clyde Consultants' Estimate of In-Place MSW Tonnage-Cinder Lake Landfill from their report titled, "Initial Design Capacity Report and Non-methane Organic Compounds (NMOC) Emission Rate Analysis for the Cinder Lake Landfill Flagstaff, Arizona," dated December 30, 1998. The chart detailing both the data from Woodward-Clyde Consultants' Estimate of In-Place MSW Tonnage-Cinder Lake Landfill as well as the annual refuse acceptance rate on a calendar year basis from 1994 to 2009 is located in Appendix E, Table 3. The average annual refuse acceptance rate from 1965 to 2009 was calculated to be 86,712 Mg/yr.

The 40 CFR Part 60.754 specified values of the methane generation rate (k) and methane generation potential (L_o) were used. The values entered were k = 0.02/yr and L_o = 170m^3/Mg.
Hydrogeochem, Inc. conducted Tier 2 sampling at CLL in October 2008. The concentration of NMOC was reported as 92 ppm as hexane.

$$M_{NMOC} = 2\, L_o\, R\, (e^{-kc} - e^{-kt})\, (C_{NMOC})\, (3.595\text{x}\ 10^{-9})$$

M_{NMOC} = mass emission rate of NMOC (Mg/yr)
L_o = methane generation potential (m^3/Mg)
R = annual refuse acceptance rate (Mg/yr)
k = methane generation rate constant (yr^{-1})
t = age of landfill (yr)

C_{NMOC} = site specific concentration of NMOC (ppm as hexane) based on 2003 Tier-2
c = time since closure (yr)
3.6×10^{-9} = conversion factor

$M_{NMOC} = (2)(170\ m^3/Mg)(86{,}712 MG/yr)(e^{-(0.02/yr)(0\ yr)} - e^{-(0.02/yr)(43yr)})(92$ ppm as hexane$)(3.595 \times 10^{-9})$
$M_{NMOC} = 5.71$ Mg/yr
$M_{NMOC} = 6.29$ Tons/yr

4. VOC & HAP Emissions\

The VOC emissions were calculated using the equations from AP-42 Chapter 2.4.4.1 (Uncontrolled Emissions), Equation (3).
$Q_p = 1.82\ Q_{CH4} \times C_p/(1 \times 10^6)$
where:
Q_p=Emission rate of pollutant P (i.e. VOC)
Q_{CH4}=Methane generation rate, m^3/yr (From Landfill Gas Emissions Model)
C_p=Concentraion of P in landfill gas, ppmv and
1.82 = Multiplication factor 9assumes that approcimately 55 percent o landfill gas is CH_4 and 45 percent is CO_2, N_2, and other constituents).

Default concentrations for landfill gas constituents are dound in Table 2.4-1. Also, a complete listing of the estimated emissions of HAPs and VOCs is included in Appendix E, Table 5. HAP emissions are reported in i-Steps as a combination of HAP's and NMOC.

C. SUMMARY

The emissions at CLL were estimated by using the methodology described in the EPA AP-42 Chapters 13.2.2, Chapters 13.2.4 and Chapter 2.4. These methods were used to estimate particulate emissions ($PM_{2.5}$, PM_{10}, and TSP), NMOC, and VOC emissions. The following table summarizes the calculated emissions from the CLL during 2009:

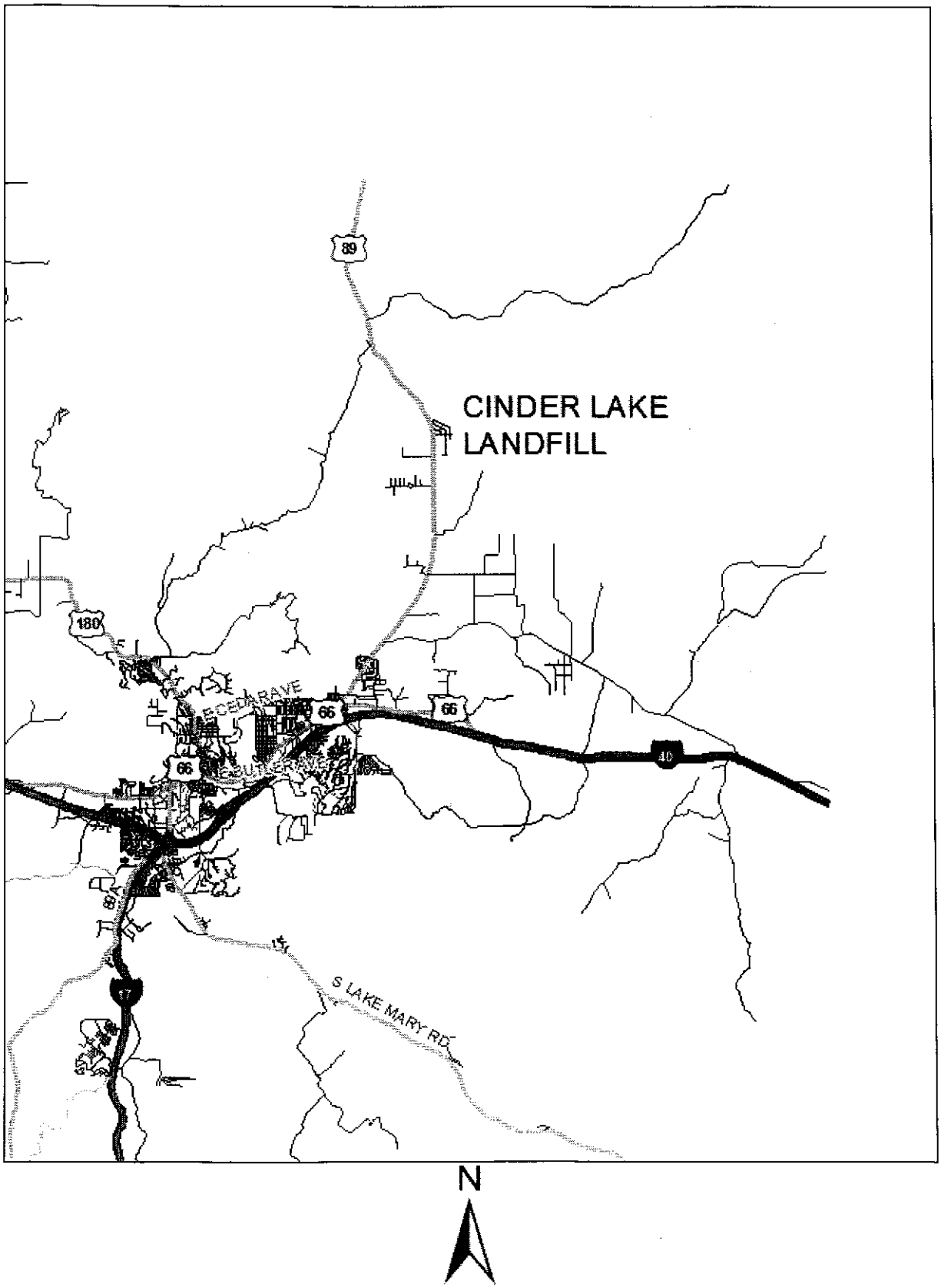
Emissions Summary 2009

Pollutant	Emission Rate (ton/yr)
$PM_{2.5}$	1.31
PM_{10}	8.98
TSP	40.01
VOC	3.9
NMOC	6.29
HAP	7.375
HAP & NMOC (combined)	13.665

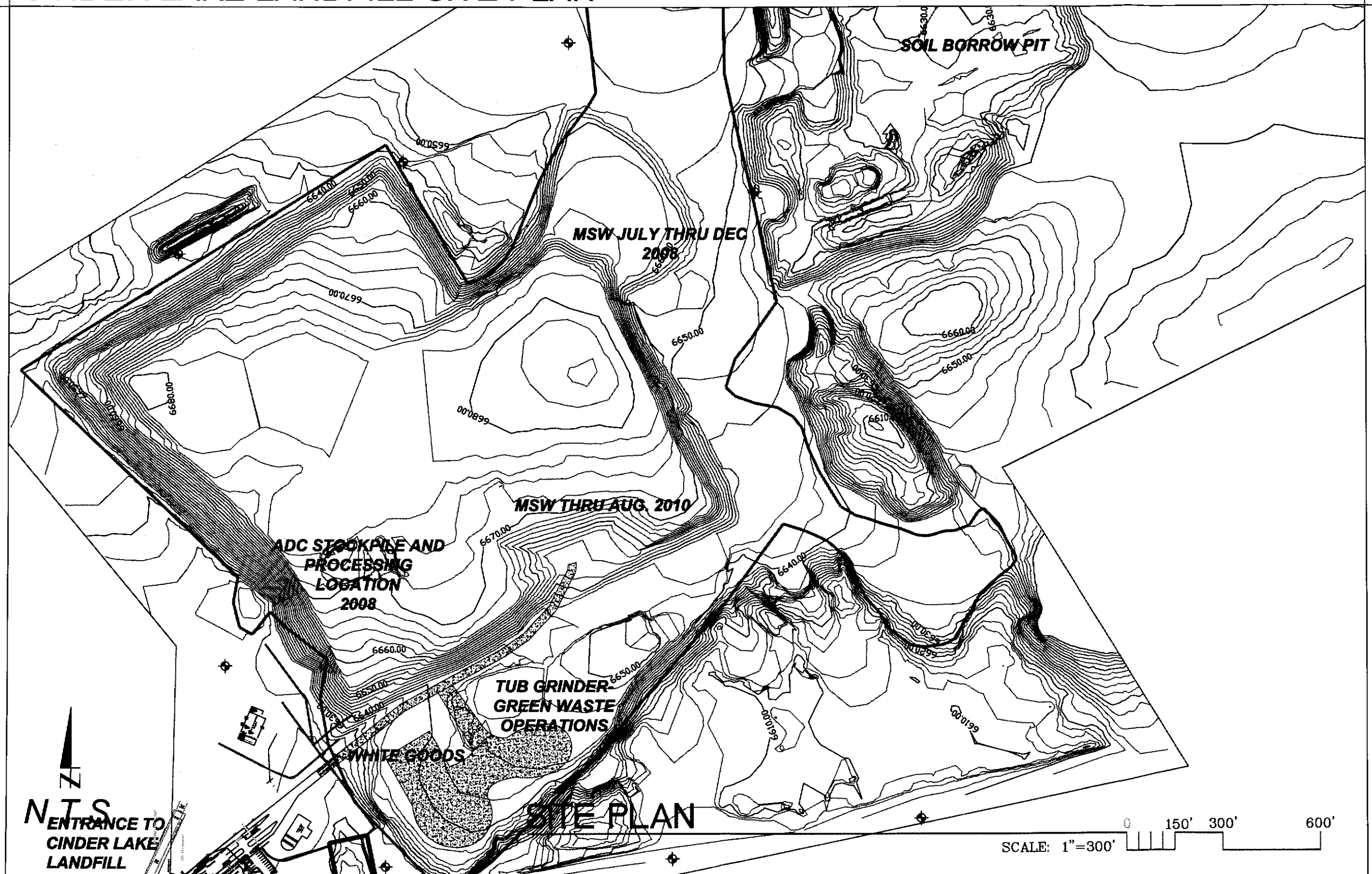
Appendix A

Figure 1: Location Map
Figure 2: Facility Site Plan

FIGURE 1



CINDER LAKE LANDFILL SITE PLAN



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CITY OF FLAGSTAFF, AZ
PUBLIC WORKS
DEPARTMENT

FIGURE 2

Appendix B

Table 1: Landfill Operations Summary
Table 2: Landfill Equipment Summary
Figure 3: Operation Flow Chart

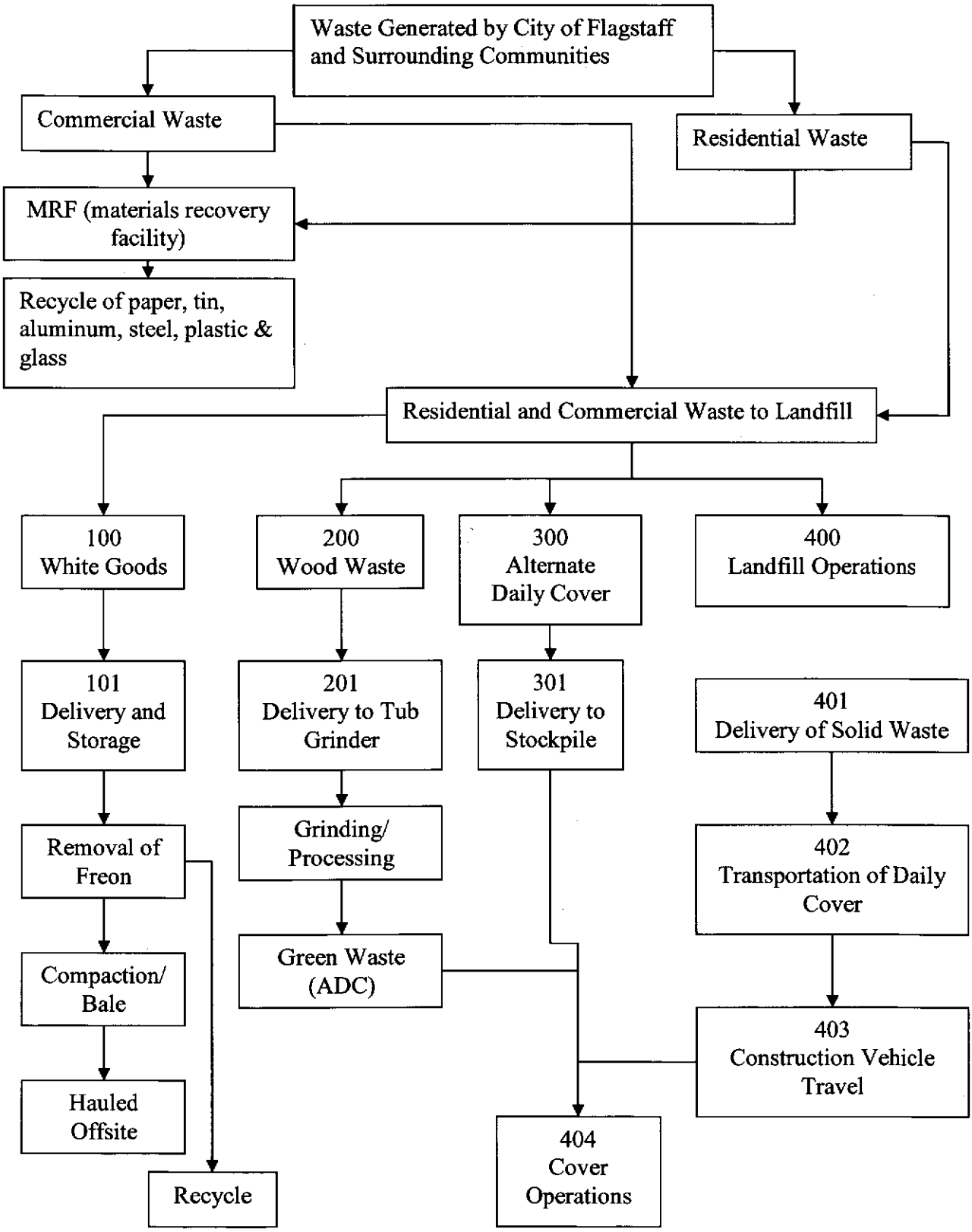
Table 1: Cinder Lake Landfill Operation Summary

Operation ID	Operation Name	Process ID	Process Name	Equipment
100	White Goods Collection	101	Delivery and Storage	Citizen truck
				City truck
				County truck
				Commercial truck
200	Tub Grinder	201	Delivery to Tub Grinder	Citizen truck
				City truck
				County truck
				Commercial truck
300	Alternate Daily Cover	301	Delivery to Stockpile	Semi Truck
400	Landfill Operations	401	Delivery of Solid Waste	Citizen truck
				City truck
				County truck
				Commercial truck
		402	Transportation of Daily Cover	Scraper
		403	Construction Vehicle Travel	D-8R Dozer
				966 Loader
				Motor Grader
				Water Truck
		404	Cover Operations	826 Compactor
500	Landfill Gas Emissions	501	NMOC Emissions	NA
		502	VOC Emissions	NA
		503	HAP Emissions	NA

Table 2: Equipment Summary

Equipment Name	Maximum Rated Capacity	Year Manufactured	Serial Number	Model	Manufacturer	Equipment ID Number
Motor Grader	240 hp	1989	72V11972	14H	Caterpiller	S3-164
4WD Pick-up Truck	150 hp	1993	2FTEF14NXPCA32022	1/2 ton	Ford	G8-28
2WD Pick-up Truck	150 hp	1994	2FTEF115N1RCA70028	1/2 ton	Ford	G8-37
4WD Pick-up Truck	202 hp	2003	1FTRF18W53NB39391	1/2 ton	Ford	G8-15
4WD Pick-up Truck	202 hp	2006	1FTRX14W16KC17836	1/2 ton	Ford	G8-41
4WD Pick-up Truck	210 hp	1997	1FTHX26HVEB26511	3/4 ton	Ford	G8-16
Tub Grinder	285 hp	2006	181590353A	Crambo 6000	Komptech	G8-16
14 CY Dump Truck	250 hp	1987	1HTZPJURIHHA23520	S-2500	International	G8-35
Compactor	340 hp	2004	AYH00633	826-G	Caterpiller	G8-21
Compactor	340 hp	1998	7LN00363	826	Caterpiller	G8-18
Water Truck	250 hp	1978	A90AVFA7277	Tanker	Ford	G8-43
5-YD Loader	253 hp	1993	4YG01302	966F	Caterpiller	S3-184
Scraper Auger	249 hp	1998	IDL00517	627E	Caterpiller	G8-3
Dozer	305 hp	1998	7XMO3295	D8R	Caterpiller	G8-24
Wheel Loader	253 hp	2008	OQD015X86	966H	Caterpiller	G8-33
Backhoe	90 hp	1993	JJG0171690	580 K	Case	G8-36

Figure 3-Operation Flow Chart



Appendix C

Table 4: Vehicle Miles Traveled

Table 4-Vehicle Miles Traveled at Cinder Lake Landfill 2009

Process	Vehicles per Day	Length of Travel Route (roundtrip) (miles)	Vehicle Miles Traveled in 2009 (VMT)
White Goods Delivery	8	0.82	2,381
Tub Grinder Delivery	10	0.45	1,634
ADC Delivery	10	0.88	4,503
Solid Waste to Working Face	108	0.70	24,489
Daily Cover Delivery	6	0.60	908
Const. Vehicle Travel	5.50	varies	1,349

Appendix D

PM Emission Rate Calculations

100 White Goods Delivery 2009

Vehicle Miles Traveled (VMT)

Type of Vehicle	Trips Per Day	Average Vehicle Speed (MPH)	Round Trip Mileage	Vehicle Miles Traveled Per Day	Vehicle Miles Traveled Per Year
Pick-up Truck	5.00	10.00	0.82	4.10	1,488.30
P.U. Truck w/Trailer	2.00	10.00	0.82	1.64	595.32
Flat Bed / Dump Truck	1.00	10.00	0.82	0.82	297.66
TOTAL	8.00			6.56	2,381.28

Mean Vehicle Weight (W)

Type of Vehicle	Weight (Tons)	Percentage of Total Miles Traveled
Pick-up Truck	2.20	62.50
P.U. Truck w/Trailer	2.60	25.00
Flat Bed / Dump Truck	15.00	12.50

Mean Weight Based on % Mileage: 3.900 Tons

PM 2.5 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{0.38\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{3.90}{3}\right)^{0.4}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 2.5 E_{ext} = 0.237 lbs/vmt

PM 10 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{2.6\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{3.90}{3}\right)^{0.4}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 10 E_{ext} = 1.622 lbs/vmt

PM 30 / TSP Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{10\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{3.90}{3}\right)^{0.5}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.4}}$$

PM 30 E_{ext} = 6.404 lbs/vmt

Estimated Emissions (Tons per Year)

TPY =(Pollutant lbs/vmt)(Total vmt/yr)(ton/2000 lbs)

PM 2.5 TPY = $(0.237\ ^{lbs}/_{vmt})(2381.28\ ^{vmt}/_{yr})$ / 2000 lbs
PM 10 TPY = $(1.622\ ^{lbs}/_{vmt})(2381.28\ ^{vmt}/_{yr})$ / 2000 lbs
PM 30 TPY = $(6.404\ ^{lbs}/_{vmt})(2381.28\ ^{vmt}/_{yr})$ / 2000 lbs

Pollutant	TPY
PM 2.5	0.282
PM 10	1.931
PM 30 / TSP	7.625

80% Reduction for Dust Control with Water Truck

80% Reduction = TPY (1-.80)

Pollutant	TPY
PM 2.5	0.056
PM 10	0.386
PM 30 / TSP	1.525

200 Tub Grinder Delivery 2009

Vehicle Miles Traveled (VMT)

Type of Vehicle	Trips Per Day	Average Vehicle Speed (MPH)	Round Trip Mileage	Vehicle Miles Traveled Per Day	Vehicle Miles Traveled Per Year
Pick-up Truck	5.00	10.00	0.45	2.25	816.75
P.U. Truck w/Trailer	2.00	10.00	0.45	0.90	326.70
Flat Bed / Dump Truck	3.00	10.00	0.45	1.35	490.05
TOTAL	10.00			4.50	1,633.50

Mean Vehicle Weight (W)

Type of Vehicle	Weight (Tons)	Percentage of Total Miles Traveled
Pick-up Truck	2.20	50.00
P.U. Truck w/Trailer	2.60	20.00
Flat Bed / Dump Truck	15.00	30.00

Mean Weight Based on % Mileage: 6.120 Tons

PM 2.5 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{0.38\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{6.12}{3}\right)^{0.4}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 2.5 E_{ext} = 0.284 lbs/vmt

PM 10 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{2.6\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{6.12}{3}\right)^{0.4}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 10 E_{ext} = 1.942 lbs/vmt

PM 30 / TSP Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{10\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{6.12}{3}\right)^{0.5}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.4}}$$

PM 30 E_{ext} = 8.023 lbs/vmt

Estimated Emissions (Tons per Year)

TPY =(Pollutant lbs/vmt)(Total vmt/yr)(ton/2000 lbs)

PM 2.5 TPY = $(0.284\ ^{lbs}/_{vmt})(1633.50\ ^{vmt}/_{yr})$ / 2000 lbs

PM 10 TPY = $(1.942\ ^{lbs}/_{vmt})(1633.50\ ^{vmt}/_{yr})$ / 2000 lbs

PM 30 TPY = $(8.023\ ^{lbs}/_{vmt})(1633.50\ ^{vmt}/_{yr})$ / 2000 lbs

Pollutant	TPY
PM 2.5	0.232
PM 10	1.586
PM 30 / TSP	6.553

80% Reduction for Dust Control with Water Truck

80% Reduction = TPY (1-.80)

Pollutant	TPY
PM 2.5	0.046
PM 10	0.317
PM 30 / TSP	1.311

300 Alternate Daily Cover Delivery 2009

Vehicle Miles Traveled (VMT)

Type of Vehicle	Trips Per Day	Average Vehicle Speed (MPH)	Round Trip Mileage	Vehicle Miles Traveled Per Day	Vehicle Miles Traveled Per Year
Semi with Trailer	10.00	10.00	1.24	12.41	4,503.13
TOTAL	10.00			12.41	4,503.13

Mean Vehicle Weight (W)

Type of Vehicle	Weight (Tons)	Percentage of Total Miles Traveled
Semi with Trailer	23.00	100.00

Mean Weight Based on % Mileage: 23.000 Tons

PM 2.5 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{0.38\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{23.0}{3}\right)^{0.4}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 2.5 E_{ext} = 0.482 lbs/vmt

PM 10 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{2.6\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{23.0}{3}\right)^{0.4}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 10 E_{ext} = 3.299 lbs/vmt

PM 30 / TSP Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{10\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{23.0}{3}\right)^{0.5}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.4}}$$

PM 30 E_{ext} = 15.553 lbs/vmt

Estimated Emissions (Tons per Year)

TPY =(Pollutant lbs/vmt)(Total vmt/yr)(ton/2000 lbs)

PM 2.5 TPY = $(0.482\ ^{lbs}/_{vmt})(3194.40\ ^{vmt}/_{yr})$ / 2000 lbs
PM 10 TPY = $(3.299\ ^{lbs}/_{vmt})(3194.40\ ^{vmt}/_{yr})$ / 2000 lbs
PM 30 TPY = $(15.553\ ^{lbs}/_{vmt})(3194.40\ ^{vmt}/_{yr})$ / 2000 lbs

Pollutant	TPY
PM 2.5	1.085
PM 10	7.427
PM 30 / TSP	35.018

80% Reduction for Dust Control with Water Truck

80% Reduction = TPY (1-.80)

Pollutant	TPY
PM 2.5	0.217
PM 10	1.485
PM 30 / TSP	7.004

401 MSW Delivery 2009

Vehicle Miles Traveled (VMT)

Type of Vehicle	Trips Per Day	Average Vehicle Speed (MPH)	Round Trip Mileage	Vehicle Miles Traveled Per Day	Vehicle Miles Traveled Per Year
Truck: Top Loader	8.00	10.00	0.67	5.40	1,959.10
Truck: Side/Rear Loader	12.00	10.00	0.67	8.10	2,938.65
Truck: Roll Off	12.00	10.00	0.67	8.10	2,938.65
Flat Bed / Dump Truck	8.00	10.00	0.67	5.40	1,959.10
P.U. Truck w/Trailer	10.00	10.00	0.67	6.75	2,448.88
Pick-up Truck	50.00	10.00	0.67	33.73	12,244.38
TOTAL	100.00			67.46	24,488.75

Mean Vehicle Weight (W)

Type of Vehicle	Weight (Tons)	Percentage of Total Miles Traveled
Truck: Top Loader	32.00	8.00
Truck: Side/Rear Loader	24.00	12.00
Truck: Roll Off	28.00	12.00
Flat Bed / Dump Truck	15.00	8.00
P.U. Truck w/Trailer	2.60	10.00
Pick-up Truck	2.20	50.00

Mean Weight Based on % Mileage: 11.360 Tons

PM 2.5 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{0.38(^{6.4}/_{12})^{0.8}\,(11.360/_{3})^{0.4}\,(^{15}/_{15})\,(^{365-26}/_{365})}{(^{0.2}/_{0.2})^{0.3}}$$

PM 2.5 E_{ext} = 0.364 lbs/vmt

PM 10 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{2.6(^{6.4}/_{12})^{0.8}\,(11.360/_{3})^{0.4}\,(^{15}/_{15})\,(^{365-26}/_{365})}{(^{0.2}/_{0.2})^{0.3}}$$

PM 10 E_{ext} = 2.488 lbs/vmt

PM 30 / TSP Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{10(^{6.4}/_{12})^{0.8}\,(11.360/_{3})^{0.5}\,(^{15}/_{15})\,(^{365-26}/_{365})}{(^{0.2}/_{0.2})^{0.4}}$$

PM 30 E_{ext} = 10.930 lbs/vmt

Estimated Emissions (Tons per Year)

TPY =(Pollutant lbs/vmt)(Total vmt/yr)(ton/2000 lbs)

PM 2.5 TPY = (0.364 $^{lbs}/_{vmt}$)(25,410.00 $^{vmt}/_{yr}$) / 2000 lbs
PM 10 TPY = (2.488 $^{lbs}/_{vmt}$)(25,410.00 $^{vmt}/_{yr}$) / 2000 lbs
PM 30 TPY = (10.930 $^{lbs}/_{vmt}$)(25,410.00 $^{vmt}/_{yr}$) / 2000 lbs

Pollutant	TPY
PM 2.5	4.452
PM 10	30.459
PM 30 / TSP	133.835

80% Reduction for Dust Control with Water Truck

80% Reduction = TPY (1-.80)

Pollutant	TPY
PM 2.5	0.890
PM 10	6.092
PM 30 / TSP	26.767

402 Daily Cover Delivery 2009

Vehicle Miles Traveled (VMT)

Type of Vehicle	Trips Per Day	Average Vehicle Speed (MPH)	Round Trip Mileage	Vehicle Miles Traveled Per Day	Vehicle Miles Traveled Per Year
Scraper	6.00	10.00	0.42	2.50	907.50
TOTAL	6.00			2.50	907.50

Mean Vehicle Weight (W)

Type of Vehicle	Weight (Tons)	Percentage of Total Miles Traveled
Scraper	40.00	100.00

Mean Weight Based on % Mileage: 40.000 Tons

PM 2.5 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{0.38\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{40}{3}\right)^{0.4}\left(\frac{10}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 2.5 E_{ext} = 0.401 lbs/vmt

PM 10 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{2.6\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{40}{3}\right)^{0.4}\left(\frac{10}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 10 E_{ext} = 2.744 lbs/vmt

PM 30 / TSP Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{10\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{40}{3}\right)^{0.5}\left(\frac{10}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.4}}$$

PM 30 E_{ext} = 13.674 lbs/vmt

Estimated Emissions (Tons per Year)

TPY =(Pollutant lbs/vmt)(Total vmt/yr)(ton/2000 lbs)

PM 2.5 TPY = $(0.401\ ^{lbs}/_{vmt})(1306.8\ ^{vmt}/_{yr})$ / 2000 lbs
PM 10 TPY = $(2.744\ ^{lbs}/_{vmt})(1306.8\ ^{vmt}/_{yr})$ / 2000 lbs
PM 30 TPY = $(13.674\ ^{lbs}/_{vmt})(1306.8\ ^{vmt}/_{yr})$ / 2000 lbs

Pollutant	TPY
PM 2.5	0.182
PM 10	1.245
PM 30 / TSP	6.204

80% Reduction for Dust Control with Water Truck

80% Reduction = TPY (1-.80)

Pollutant	TPY
PM 2.5	0.036
PM 10	0.249
PM 30 / TSP	1.241

403 Construction Vehicle Travel 2009

Vehicle Miles Traveled (VMT)

Type of Vehicle	Trips Per Day	Average Vehicle Speed (MPH)	Round Trip Mileage	Vehicle Miles Traveled Per Day	Vehicle Miles Traveled Per Year
D8-R Dozer	1.00	10.00	0.19	0.19	68.97
966 Loader	1.00	10.00	0.34	0.34	123.42
Motor Grader	0.50	10.00	0.91	0.46	165.17
Water Truck	3.00	10.00	0.91	2.73	990.99
TOTAL	5.50			3.72	1,348.55

Mean Vehicle Weight (W)

Type of Vehicle	Weight (Tons)	Percentage of Total Miles Traveled
D8-R Dozer	30.00	5.11
966 Loader	25.25	9.15
Motor Grader	15.00	12.25
Water Truck	25.00	73.49

Mean Weight Based on % Mileage: 24.054 Tons

PM 2.5 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{0.38\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{24.24}{3}\right)^{0.4}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 2.5 E_{ext} = 0.491 lbs/vmt

PM 10 Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{2.6\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{24.24}{3}\right)^{0.4}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.3}}$$

PM 10 E_{ext} = 3.358 lbs/vmt

PM 30 / TSP Emissions Factor (lbs per VMT)

$$E_{ext} = \frac{10\left(\frac{6.4}{12}\right)^{0.8}\left(\frac{24.24}{3}\right)^{0.5}\left(\frac{15}{15}\right)\left(\frac{365-26}{365}\right)}{\left(\frac{0.2}{0.2}\right)^{0.4}}$$

PM 30 E_{ext} = 15.905 lbs/vmt

Estimated Emissions (Tons per Year)

TPY =(Pollutant lbs/vmt)(Total vmt/yr)(ton/2000 lbs)

PM 2.5 TPY = $(0.491\ ^{lbs}/_{vmt})(1{,}349\ ^{vmt}/_{yr})$ / 2000 lbs
PM 10 TPY = $(3.358\ ^{lbs}/_{vmt})(1{,}349\ ^{vmt}/_{yr})$ / 2000 lbs
PM 30 TPY = $(15.905\ ^{lbs}/_{vmt})(1{,}349\ ^{vmt}/_{yr})$ / 2000 lbs

Pollutant	TPY
PM 2.5	0.331
PM 10	2.264
PM 30 / TSP	10.724

80% Reduction for Dust Control with Water Truck

80% Reduction = TPY (1-.80)

Pollutant	TPY
PM 2.5	0.066
PM 10	0.453
PM 30 / TSP	2.145

404 Cover Operations 2009

Weight of Cover in Tons Per Year (TPY)
Total Refuse Disposal in 2009: **117,404 Tons**

Estimated Refuse Density: 1,200 lbs/cy

Estimated Cover Volume % of Refuse (Based on a 1:4 Ratio): 25%

Estimated Density of Cover Soil: 1,350 lb/yd^3

$$yd^3\ (msw)/yr = \frac{(117{,}404\ ton/yr)(2{,}000\ lbs/ton)}{1{,}350\ lbs/cy}$$

yd^3 (msw)/yr = 173,932

yd^3 (msw & cover)/yr = 231,909

yd^3(cover)/yr = 57,977

$$ton\ (cover)/yr = \frac{(57{,}977\ yd^3/yr)(1{,}350\ lb/yd^3)}{2000\ lb/ton}$$

ton (cover)/yr = 39,135

Emissions Factors (AP-42 Equation from Section 13.2.4)

$$E = \frac{K(0.0032)(U/5)^{1.3}}{(M/2)^{1.4}}\ lbs/ton$$

		PM 2.5	PM 10	PM 30
Particulate Size Multiplier	K =	0.11	0.35	0.74
Wind Speed	U = 10 mph			
Moisture Content*	M = 14 %			

*Typical value for moisture content taken from geotechnical soils report from Maxim Technologies

$$E_{PM\ 2.5} = \frac{0.11(0.0032)(10/5)^{1.3}}{(14/2)^{1.4}}$$ $E_{PM\ 2.5}$ = 5.69E-05

$$E_{PM\ 10} = \frac{0.35(0.0032)(10/5)^{1.3}}{(14/2)^{1.4}}$$ $E_{PM\ 10}$ = 1.81E-04

$$E_{PM\ 30} = \frac{0.74(0.0032)(10/5)^{1.3}}{(14/2)^{1.4}}$$ $E_{PM\ 30}$ = 3.82E-04

Emissions (TPY)
Emissions = (E)(Cover $^{ton}/_{year}$)($^{ton}/_{2000\ lbs}$)

$PM_{2.5} = (2.74 \times 10^{-5}\ ^{lbs}/_{ton})(38{,}868\ ^{ton}/_{year})(^{ton}/_{2000\ lbs})$ $PM_{2.5}$ = 1.11E-03 ton/year

$PM_{10} = (1.81 \times 10^{-4}\ ^{lbs}/_{ton})(38{,}868\ ^{ton}/_{year})(^{ton}/_{2000\ lbs})$ PM_{10}= 3.54E-03 ton/year

$PM_{30} = (3.82 \times 10^{-4}\ ^{lbs}/_{ton})(38{,}868\ ^{ton}/_{year})(^{ton}/_{2000\ lbs})$ PM_{30}= 7.484E-03 ton/year

80% Reduction for Dust Control with Water Truck

80% Reduction = TPY (1-.80)

Pollutant	TPY
PM 2.5	2.22E-04
PM 10	7.08E-04
PM 30 / TSP	1.50E-03

501 NMOC Emissions 2009

$M_{NMOC} = 2\ L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

M_{NMOC} = Mass emission rate of NMOC (Mg/yr)
L_0 = Methane generation potential **170 m^3/Mg**
R = Annual refuse acceptance rate (Mg/yr)= **86,712** Mg/yr
k = Methane generation rate constant (yr^{-1}) **0.02/yr**
c = Time since closure **0 years**
t = Age of landfill **44** years
C_{NMOC} = Site Specific Concentration of NMOC (ppm as hexane) **92 ppm as hexane**
3.595×10^{-9} = Conversion factor

$M_{NMOC\ mg/yr} = 2\ (170\ m^3/Mg)(84{,}898\ Mg/yr)(e^{-(0.02)(0)} - e^{-(0.02)(42)})(65.7ppm\ as\ hexane)(3.595 \times 10^{-9})$

M_{NMOC} = **5.71 Mg/YR**

$M_{NMOC\ tons/yr} = (3.579\ Mg/yr)(1/0.9072\ Mg/ton)$

M_{NMOC} = **6.29 tons/yr**

502 VOC and 503 HAPs Emissions 2009

Methane Emissions

$Q_{CH4} = L_0R(e^{-kc} - e^{-kt})$

Q_{CH4} = Methane emissions (m^3/yr)
L_0 = Methane generation potential **170 m^3/Mg**
R = Annual refuse acceptance rate (Mg/yr) 86,712 **Mg/yr**
k = Methane generation rate constant (yr^{-1}) **0.02/yr**
c = Time since closure **0 years**
t = Age of landfill (years)= **44** years

$Q_{CH4} = (170\ m^3/Mg)\ (87{,}557\ Mg/yr)\ (e^{-(0.02)(0)} - e^{-(0.02)(44)})$

Q_{CH4} = 8,626,709 m^3/yr

VOC and HAP Emissions

Q_P = Pollutant generation rate (TPY) calculated for each pollutant
$Q_P = 1.82(Q_{CH4})(C_P)/10^6$

Q_P = Emission rate of pollutant P m^3/yr
Q_{CH4} = 8,626,709 m^3/yr
C_P = Concentration of pollutant P ppmv
1.82 = Multiplication factor that assumes that landfill gas is 55% CH_4 and 45% is CO_2 and other trace constituents (100% / 55%)

Q_P=1.82(8,710,775 m^3/yr)(C_P)(MW_P g/mol)(1 lb/453.6g)(1mol/24.04L)(1 ton/2000 lb)(1L/0.0010 m3)/10^6

MW_P = Molecular weight of pollutant P (g/mol)

Appendix E

Table 3: Estimate of In-Place MSW
Table 5: Summary of Estimated HAP and VOC Emissions
NMOC and VOC Emission Calculations

Table 3 - Cinder Lake Landfill: Estimate of In-Place MSW 2009

Fiscal Year	Documented Disposal Rate (Tons/year)	Annual tonnage estimate using Best-Fit Trend Line for existing disposal data	Annual tonnage estimate using 75/76 data for previous years and linear increase from 75/76 to 85/86	Annual Tonnage - based on per capita tonnage trendline	Average of 3 preceding columns (tons)	Average of 3 Preceding Columns (Mg)	In place tonnage	In place Mg
65/66		5549	20,833	16,440	14,274	12,949	14,274	12,949
66/67		11098	20,833	20,146	17,359	15,748	31,633	28,697
67/68		16646	20,833	23,988	20,489	18,587	52,122	47,284
68/69		22195	20,833	27,971	23,666	21,470	75,788	68,754
69/70		27744	20,833	32,100	26,892	24,396	102,681	93,150
70/71		33293	20,833	36,378	30,168	27,368	132,849	120,518
71/72		38842	20,833	39,872	33,182	30,103	166,031	150,621
72/73		44390	20,833	43,468	36,230	32,868	202,261	183,488
73/74		49939	20,833	47,168	39,313	35,664	241,575	219,153
74/75		55488	20,833	50,974	42,432	38,493	284,006	257,646
75/76	20,833	61037	20,833	54,890	45,587	41,356	329,593	299,002
76/77		66586	29,971	58,920	51,826	47,015	381,419	346,017
77/78		72134	39,108	63,066	58,103	52,710	439,521	398,727
78/79		77683	48,246	67,332	64,420	58,441	503,942	457,168
79/80		83232	57,383	71,721	70,779	64,209	574,720	521,377
80/81		88781	66,520	76,316	77,206	70,040	651,926	591,417
81/82		94330	75,658	80,836	83,608	75,848	735,534	667,265
82/83		99878	84,795	85,483	90,052	81,694	825,586	748,959
83/84		105427	93,933	90,261	96,540	87,580	922,126	836,539
84/85		110976	103,070	95,173	103,073	93,506	1,025,199	930,045
85/86	112,207				112,207	101,792	1,137,406	1,031,838
86/87	147,549				147,549	133,854	1,284,955	1,165,692
87/88	112,400				112,400	101,968	1,397,355	1,267,659
88/89	116,438				116,438	105,631	1,513,793	1,373,290
89/90	117,714				117,714	106,788	1,631,507	1,480,078
90/91	127,629				127,629	115,783	1,759,136	1,595,861
91/92	149,000				149,000	135,171	1,908,136	1,731,032
92/93	170,948				170,948	155,081	2,079,084	1,886,113
93/94	75,915				75,915	68,869	2,154,999	1,954,982
94	125,644				125,644	113,982	2,280,643	2,068,964
95	119,112				119,112	108,057	2,399,755	2,177,021
96	149,232				149,232	135,381	2,548,987	2,312,402
97	132,253				132,253	119,978	2,681,240	2,432,379
98	139,477				139,477	126,531	2,820,716	2,558,910
99	140,502				140,502	127,461	2,961,218	2,686,372
2000	117,597				117,597	106,682	3,078,815	2,793,054
2001	109,835				109,835	99,641	3,188,650	2,892,694
2002	126,650				126,650	114,895	3,315,300	3,007,589
2003	117,880				117,880	106,939	3,433,180	3,114,528
2004	134,367				134,367	121,896	3,567,547	3,236,424
2005	151,188				151,188	137,155	3,718,735	3,373,579
2006	152,234				152,234	138,104	3,870,969	3,511,684
2007	157,408				157,408	142,798	4,028,377	3,654,482
2008	155,470				155,470	141,040	4,183,847	3,795,522
2009	117,404				117,404	106,507	4,301,251	3,902,029
Total							**4,301,251**	**3,902,029**
Average Acceptance of MSW from 1965 to 2009 (Mg/yr)						**86,712**		

Table data from 1965-1994 taken from Woodward-Clyde's Initial Design Capacity Report and NMOC analysis for the Cinder Lake Landfill. Table data from 1994-2006 taken from City of Flagstaff Landfill Monthly Tonnage Reports.

Table 5 - Estimated Total VOC and HAP Emissions 2009

COMPOUND	MW_p MOLECULAR WEIGHT g/mol	C_p DEFAULT CONC. (ppmv)[1]	Conversion constant		Q_p HAP GENERATION (tpy)
1,1,1-Trichloroethane (methyl chloroform)	133.41	0.48	7.2E-04		0.046
1,1,2,2-Tetrachloroethane	167.85	1.11	7.2E-04		0.134
1,1-Dichloroethane (ethylidene dichloride)	98.97	2.35	7.2E-04		0.167
1,1-Dichloroethane (vinylidene chloride)	96.94	0.2	7.2E-04		0.014
1,2-Dichloroethane (ethylene dichloride)	98.96	0.41	7.2E-04		0.029
1,2-Dichloropropane (propylene dichloride)	112.99	0.18	7.2E-04		0.015
[illegible]	60.11	50.1	7.2E-04		
[illegible]	58.08	7.01	7.2E-04		
Acrylonitrile	53.06	6.33	7.2E-04		0.242
Benzene	78.11	1.91	7.2E-04		0.107
[illegible]	163.83	3.13	7.2E-04		
Carbon disulfide	76.13	0.58	7.2E-04		0.032
Carbon tetrachloride	153.84	0.004	7.2E-04		0.000
Carbonyl sulfide	60.07	0.49	7.2E-04		0.021
Chlorobenzene	112.56	0.25	7.2E-04		0.020
Chloroethane (ethyl chloride)	64.52	1.25	7.2E-04		0.058
Chloroform	119.39	0.03	7.2E-04		0.003
Dichlorobenzene	147	0.21	7.2E-04		0.022
Dichloromethane (methylene chloride)	84.94	14.3	7.2E-04		0.874
[illegible]	46.08	27.2	7.2E-04		
Ethylbenzene	106.16	4.61	7.2E-04		0.352
Hexane	86.18	6.57	7.2E-04		0.408
Mercury (total)	200.61	0.000292	7.2E-04		0.000
Methyl ethyl ketone	72.11	7.09	7.2E-04		0.368
Methyl isobutyl ketone	100.16	1.87	7.2E-04		0.135
[illegible]	72.15	3.29	7.2E-04		
t-1,2-dichloroethene	96.94	2.84	7.2E-04		0.198
Toluene	92.13	39.3	7.2E-04		2.607
Trichloroethylene (trichloroethene)	131.4	2.82	7.2E-04		0.267
Vinyl chloride	62.5	7.34	7.2E-04		0.330
Xylenes	106.16	12.1	7.2E-04		0.925
Q_P Totals (tpy)					**7.375**

$Q_P = 1.82\ (Q_{CH4})\ (C_P)\ /\ 10^6$

Conversions Constant=1.82(8,626,709 m^3/yr)(1 lb/453.6g)(1mol/24.04L)(1 ton/2000 lb)(1L/0.0010 m3)/10^6

Conversions Constant = 0.0007199

[1]Default Concentrations from Table 2.4.1 &Table 2.42 (Benzene & Toluene), in Section 2.4 of the USEPA AP42, Fifth Edition. Table 2.4.1 is found on page 2.4-10,11, & 12.

Appendix F

i-steps Infinity Results

Annual Air Emission Inventory
and Emission Statement
Facility Report

General Facility Information

Facility ID: **02144** County - **005** State - **04** Year Inventory: **2009**

Facility Name: **CINDER LAKE LANDFILL** SIC: **4953**

Street Address: **6770 E. LANDFILL ROAD**

Mail Address:

Emissions
Contact: **MATT MORALES**
Telephone #: **9285279843**

Point/General Activity Information

Point Id: **100**
Point Description: **WHITE GOODS DELIVERY**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	25	25	25

Comment:

Actual Operating Schedule for This Point:

Hours/Day	10	Start Time: 0700
Days/Week	7	
Weeks/Year	52	End Time: 1700
O3 Season Days	0	

Process/Segment Information

Process/Segment ID: **1**
Description: **DELIVERY OF WHITE GOODS**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **22960000**
Description: **Mobile Sources - Unpaved Roads**
All Unpaved Roads
Total: Fugitives
AP-42 Units: **1000 Miles**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **2381 MILES**

Comment:

Emissions Information

Pollutant	Pollutant Description	Estimated Emissions - No RE		
PM10	**PARTICULATE MATTER 10**	Method: **3**	Factor:	Tons/Yr: **0.386**
Comment:				
PM2.5	**PARTICULATE MATTER 2.5**	Method: **3**	Factor:	Tons/Yr: **0.056**
Comment:				
PT	**TOTAL PARTICULATE MATTER**	Method: **3**	Factor:	Tons/Yr: **1.525**
Comment:				

Point/General Activity Information

Point Id: **200**
Point Description: **TUB GRINDER DELIVERY**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	25	25	25

Actual Operating Schedule for This Point:

Hours/Day	10	Start Time: 0700
Days/Week	7	
Weeks/Year	52	End Time: 1700
O3 Season Days	0	

Comment:

Process/Segment Information

Process/Segment ID: **1**
Description: **DELIVERY OF GREEN WASTE**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **22960000**
Description: **Mobile Sources - Unpaved Roads**
All Unpaved Roads
Total: Fugitives
AP-42 Units: **1000 Miles**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **1633 MILES**

Comment:

Emissions Information

Pollutant	Pollutant Description	Estimated Emissions - No RE		
PM10	**PARTICULATE MATTER 10**	Method: **3**	Factor:	Tons/Yr: **0.317**
Comment:				
PM2.5	**PARTICULATE MATTER 2.5**	Method: **3**	Factor:	Tons/Yr: **0.046**
Comment:				
PT	**TOTAL PARTICULATE MATTER**	Method: **3**	Factor:	Tons/Yr: **1.311**
Comment:				

Point/General Activity Information

Point Id: **300**
Point Description: **ADC DELIVERY**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	**25**	**25**	**25**

Comment:

Actual Operating Schedule for This Point:

Hours/Day	**10**	Start Time: **0700**
Days/Week	**7**	
Weeks/Year	**52**	End Time: **1700**
O3 Season Days	**0**	

Process/Segment Information

Process/Segment ID: **1**
Description: **DELIVERY OF ADC**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **22960000**
Description: **Mobile Sources - Unpaved Roads**
All Unpaved Roads
Total: Fugitives
AP-42 Units: **1000 Miles**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **4503 MILES**

Comment:

Emissions Information

Pollutant	Pollutant Description	Estimated Emissions - No RE		
PM10	**PARTICULATE MATTER 10**	Method: **3**	Factor:	Tons/Yr: **1.485**
Comment:				
PM2.5	**PARTICULATE MATTER 2.5**	Method: **3**	Factor:	Tons/Yr: **0.217**
Comment:				
PT	**TOTAL PARTICULATE MATTER**	Method: **3**	Factor:	Tons/Yr: **7.004**
Comment:				

Point/General Activity Information

Point Id: **401**
Point Description: **MSW DELIVERY**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	**25**	**25**	**25**

Comment:

Actual Operating Schedule for This Point:

Hours/Day	**10**	Start Time: **0700**
Days/Week	**7**	
Weeks/Year	**52**	End Time: **1700**
O3 Season Days	**0**	

Process/Segment Information

Process/Segment ID: **1**
Description: **DELIVERY OF MSW**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **22960000**
Description: **Mobile Sources - Unpaved Roads**
All Unpaved Roads
Total: Fugitives
AP-42 Units: **1000 Miles**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **24488 MILES**

Comment:

Emissions Information

Pollutant	Pollutant Description	Estimated Emissions - No RE		
PM10	**PARTICULATE MATTER 10**	Method: **3**	Factor:	Tons/Yr: **6.092**
Comment:				
PM2.5	**PARTICULATE MATTER 2.5**	Method: **3**	Factor:	Tons/Yr: **0.89**
Comment:				
PT	**TOTAL PARTICULATE MATTER**	Method: **3**	Factor:	Tons/Yr: **26.767**
Comment:				

Point/General Activity Information

Point Id: **402**
Point Description: **DAILY COVER DELIVERY**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	25	25	25

Comment:

Actual Operating Schedule for This Point:

Hours/Day	10	Start Time: 0700
Days/Week	7	
Weeks/Year	52	End Time: 1700
O3 Season Days	0	

Process/Segment Information

Process/Segment ID: **1**
Description: **DELIVERY OF DAILY COVER**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **22960000**
Description: **Mobile Sources - Unpaved Roads**
All Unpaved Roads
Total: Fugitives
AP-42 Units: **1000 Miles**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **907 MILES**

Comment:

Emissions Information

Pollutant	Pollutant Description	Estimated Emissions - No RE		
PM10	**PARTICULATE MATTER 10**	Method: **3**	Factor:	Tons/Yr: **0.249**
Comment:				
PM2.5	**PARTICULATE MATTER 2.5**	Method: **3**	Factor:	Tons/Yr: **0.036**
Comment:				
PT	**TOTAL PARTICULATE MATTER**	Method: **3**	Factor:	Tons/Yr: **1.241**
Comment:				

Point/General Activity Information

Point Id: **403**
Point Description: **CONST. VEHICLE TRAVEL**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	25	25	25

Actual Operating Schedule for This Point:

Hours/Day	10	Start Time: 0700
Days/Week	7	
Weeks/Year	52	End Time: 1700
O3 Season Days	0	

Comment:

Process/Segment Information

Process/Segment ID: **1**
Description: **CONST. VEH. TRAVEL**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **22960000**
Description: **Mobile Sources - Unpaved Roads**
All Unpaved Roads
Total: Fugitives
AP-42 Units: **1000 Miles**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **1349 MILES**

Comment:

Emissions Information

Pollutant	Pollutant Description	Estimated Emissions - No RE		
PM10	**PARTICULATE MATTER 10**	Method: **3**	Factor:	Tons/Yr: **0.453**
Comment:				
PM2.5	**PARTICULATE MATTER 2.5**	Method: **3**	Factor:	Tons/Yr: **0.066**
Comment:				
PT	**TOTAL PARTICULATE MATTER**	Method: **3**	Factor:	Tons/Yr: **2.145**
Comment:				

Point/General Activity Information

Point Id: **404**
Point Description: **COVER OPERATIONS**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	**25**	**25**	**25**

Actual Operating Schedule for This Point:

Hours/Day	**10**	Start Time: **0700**
Days/Week	**7**	
Weeks/Year	**52**	End Time: **1700**
O3 Season Days	**0**	

Comment:

Process/Segment Information

Process/Segment ID: **1**
Description: **COVER OPERATIONS**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **22940000**
Description: **Mobile Sources - Paved Roads**
All Paved Roads
Total: Fugitives
AP-42 Units: **1000 Miles**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **1000 HOURS**

Comment:

Emissions Information

Pollutant	Pollutant Description	Estimated Emissions - No RE		
PM10	**PARTICULATE MATTER 10**	Method: **3**	Factor:	Tons/Yr: **0.0007**
Comment:				
PM2.5	**PARTICULATE MATTER 2.5**	Method: **3**	Factor:	Tons/Yr: **2.22e-4**
Comment:				
PT	**TOTAL PARTICULATE MATTER**	Method: **3**	Factor:	Tons/Yr: **0.0015**
Comment:				

Point/General Activity Information

Point Id: **501**
Point Description: **NMOC EMISSIONS**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	25	25	25

Actual Operating Schedule for This Point:

Hours/Day	10	Start Time: 0700
Days/Week	7	
Weeks/Year	52	End Time: 1700
O3 Season Days	0	

Comment:

Process/Segment Information

Process/Segment ID: **1**
Description: **NMOC EMISSIONS**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **26200300**
Description: **Waste Disposal, Treatment, and Recovery - Landfills**
Municipal
Total
AP-42 Units: **Acre-Years**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **Acre-Years**

Comment:

Emissions Information

Pollutant	Pollutant Description	Estimated Emissions - No RE			
HAP	**HAZARDOUS AIR POLLUTANTS**	Method: **3**	Factor:	Tons/Yr: **6.29**	

Comment: **The value for NMOC's were calculated using the equation specifiedin 40 CFR part 60.745(a)(1)(ii). Default concentrations for the methane generation rate (k, 1/year) and methane generation potential (Lo, cubic meters per megagram of solid waste) were 0.02/year and 170 cubic meters/megagram respectively. The most recent Tier II sampling indicates that Cinder Lake Landfill concentration of NMOC's is 92 ppm as hexane. The summary report for this session will sum NMOC and HAPs as HAPs.**

Point/General Activity Information

Point Id: **502**
Point Description: **VOC EMISSIONS**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	25	25	25

Actual Operating Schedule for This Point:

Hours/Day	10	Start Time: 0700
Days/Week	7	
Weeks/Year	52	End Time: 1700
O3 Season Days	0	

Comment:

Process/Segment Information

Process/Segment ID: **1**
Description: **VOC EMISSIONS**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **26200300**
Description: **Waste Disposal, Treatment, and Recovery - Landfills**
Municipal
Total
AP-42 Units: **Acre-Years**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **Acre-Years**

Comment:

Emissions Information

Pollutant	Pollutant Description		Estimated Emissions - No RE		
VOC	**VOLATILE ORGANIC COMPOUNDS**	Method: **3**	Factor:	Tons/Yr: **3.9**	

Comment:

Point/General Activity Information

Point Id: **503**
Point Description: **HAP EMISSIONS**

Design Capacity: Desgin Cap. Units:

Percent Quarterly Throughput:

Dec.-Feb.	Mar.- May	Jun.- Aug.	Sept.- Nov.
25	**25**	**25**	**25**

Actual Operating Schedule for This Point:

Hours/Day	**10**	Start Time: **0700**
Days/Week	**7**	
Weeks/Year	**52**	End Time: **1700**
O3 Season Days	**0**	

Comment:

Process/Segment Information

Process/Segment ID: **1**
Description: **HAP EMISSIONS**

Stack #: **0**
Description:

Source Classfiication Code (SCC): **26200300**
Description: **Waste Disposal, Treatment, and Recovery - Landfills**
Municipal
Total
AP-42 Units: **Acre-Years**

Height: **0**
Diameter: **0.00**
Vent Height: **0**
Velocity: **0.0**
Exit Temp.: **0**
Flow Rate: **0**

Fuel Quality: Percent Sulfur: **0.000** Percent Ash: **0.00** Heat Content: **1**

Annual Throughtput: Units: **Acre-Years**

Comment:

Emissions Information

Pollutant	Pollutant Description		Estimated Emissions - No RE		
HAP	**HAZARDOUS AIR POLLUTANTS**	Method: **3**	Factor:	Tons/Yr: **7.375**	

Comment: **The value for HAP's were calculated using the AP-42, chapter 2.4.4.1 (uncontrolled emissions), equation (3), page 2.4-5. Default concentrations for landfill gas (Cp) were taken from Table 2.4-1 (Default Concentrations for LFG Constituents). The summary report for this session will sum NMOC and HAPs as HAPs.**

Facility Pollutant Emissions Summary

Facility ID: **02144** County - **005** State - **04**

CAS	Pollutant	Emissions w/ rule tons / year	Emissions w/o rule tons / year
HAP (SPC)	HAZARDOUS AIR POLLUTANTS	13.665	13.665
PM10	PARTICULATE MATTER 10	8.9827	8.9827
PM2.5	PARTICULATE MATTER 2.5	1.311222	1.311222
PT	TOTAL PARTICULATE MATTER	39.9945	39.9945
VOC	VOLATILE ORGANIC COMPOUNDS	3.9	3.9
VOC (SPC)	VOC FROM SPECIATED CONSTITUENTS	3.9	3.9

7.0 EMISSIONS SUMMARY

Facility Name: CINDER LAKE LANDFILL

Facility Id: 02144

Point Emissions Summary

Point Id #	Point Description	VOC	NO2	CO	SO2	Particulate TSP	PM10	LEAD
100	WHITE GOODS DELIVERY					1.525	0.386	
200	TUB GRINDER DELIVERY					1.311	0.317	
300	ADC DELIVERY					7.004	1.485	
401	MSW DELIVERY					26.767	6.092	
402	DAILY COVER DELIVERY					1.241	0.249	
403	CONST. VEHICLE TRAVEL					2.145	0.453	
404	COVER OPERATIONS					0.0015	0.0007	
502	VOC EMISSIONS	3.9						

	VOC	NO2	CO	SO2	TSP	PM10	LEAD
Total Emissions	3.9				39.9945	8.9827	

Statement of Accuracy:
The data presented herein represents the best available information and is true and accurate to the best of my ability.

_____
Print Full Name and Title

(____)____-_____
Telephone

_____
Signature

____/____/____
Date