Title V Permit Evaluation

Site Number: A4618
Site Name: **Allied Waste Industries, Inc.**
Site Address: 901 Bailey Road, Pittsburg, CA 94565

Periodic Monitoring:

Summary Table(s)

Total Organic Compounds (TOC): S-1

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-1 Keller Canyon Landfill	BAAQMD 8-34-303a (expires 7/1/02) and SIP 8-34-303	1000 ppmv as methane at 3 inches above landfill surface	46.09 TPY (of POC)	Effective March 10, 1999, 40 CFR 60.755(c)(1,4, and 5) and 60.756(f) and 60.758(e) require quarterly inspections for surface emissions and record keeping and reporting for any surface emissions that exceed 500 ppmv as methane (measured at 5-10 cm above the surface). This monitoring is sufficient to demonstrate compliance with the less stringent District surface emission limit of 1000 ppmv as methane.

Lead: S-1

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-1 Keller Canyon Landfill	BAAQMD 11-1-302	Ground level concentration $\leq$ 1.0 $\mu g/m^3$ averaged over 24 hours	0.018 tpy of lead	Not Recommended

Particulate Matter: A-1

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
A-1 Landfill Gas Flare	BAAQMD 6-301	Ringelmann 1	5.41 TPY	Not Recommended
A-1 Landfill Gas Flare	BAAQMD 6-310	0.15 grains/dscf	5.41 TPY	Not Recommended

Sulfur Dioxide: A-1

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
A-1 Landfill Gas Flare	BAAQMD 9-1-301	Property line ground level limits $\leq$ 0.50 ppm for 3 minutes $\leq$ 0.25 ppm for 60 minutes $\leq$ 0.05 ppm for 24 hours	46.88 TPY	Not Recommended

The tables above contain only the federally enforceable emission limits for which there is no monitoring.

Discussion

S-1: Keller Canyon Landfill

Lead: The Keller Canyon Landfill is allowed to accept and dispose of non-hazardous contaminated soil. The soil may also be used as cover material provided that it does not contain more than 50 ppmv of total volatile organic compounds. The contaminated soil is considered non-hazardous if it contains no more than the threshold limit values for various metals and other compounds. The maximum allowable concentration for lead is 350 ppmw. Fugitive particulate matter emissions containing small amounts of lead will occur due to the handling and disposal of this contaminated soil and due to wind erosion when such soil is used as cover material. Since all lead emissions are fugitive, the landfill is not subject to the BAAQMD Regulation 11-1-301 lead emission limit of 15 pounds per day for emission points. However, the landfill is subject to the BAAQMD Regulation 11-1-302 ground level concentration limit of 1.0 $\mu g/m^3$ averaged over 24 hours.

Worst case lead emissions were calculated using AP-42 emission factor equations (see Appendix A) and by assuming that all soil used as cover contained lead at the maximum allowable concentration. Even with these overly conservative assumptions, lead emissions were determined to be no more than 0.10 pounds/day. This emission rate is 150 times lower than the emission point

standard and occurs over a very wide area (50,000 ft^2). Lead concentrations in the immediate vicinity of the daily cover operations are expected to be well below the lead concentration standard. Due to the long distances between the cover operations and the property line, lead concentrations at the property line are never expected to exceed the lead concentration limit and are likely to be non-detectable. Therefore, monitoring for lead is not recommended.

A-1: Landfill Gas Flare

PM: Particulate emissions from enclosed ground flares burning landfill gas are expected to be similar to flares burning natural gas. As with natural gas combustion, visible emissions are not normally associated with the proper combustion of landfill gas in an enclosed ground flare. Therefore, periodic monitoring for Ringelmann limits would not be appropriate for this flare.

Using the AP-42 emission factor for landfill gas combustion in a flare and a worst case landfill gas heat content of 450 BTU/scf, the particulate emission rate from the flare is expected to be 0.012 gr/dscf at 0% oxygen. The BAAQMD Regulation 6-310 of 0.15 gr/dscf is far above any expected PM emissions. It would therefore not be appropriate to add periodic monitoring for this standard.

SO_2: This facility will be subject to a federally enforceable limit of 1300 ppmv of total reduced sulfur (TRS) compounds in the landfill gas. This limit will ensure compliance with the BAAQMD and SIP Regulation 9-1-302 emission limit of 300 ppmv of SO_2 in the engine exhaust. Staff has proposed permit conditions that require the landfill gas to be monitored for total reduced sulfur content (on a weekly basis, initially) to ensure compliance with this limit. Sources complying with the 9-1-302 limit are not expected to exceed the ground level concentration limits listed in BAAQMD Regulation 9-1-301. Furthermore, a District source test indicated that the actual concentration of total reduced sulfur compounds in this facility's landfill gas was only 51.3 ppmv. At 51.3 ppmv of TRS, maximum flare emissions are 6.01 tons/year of SO_2. Monitoring for ground level SO_2 concentrations in addition to the proposed landfill gas monitoring would not be appropriate for such low levels of SO_2 emissions.

Permit Shield:

No permit shield was requested.

Alternate Operating Scenario:

No alternative operating scenarios were requested, and none have been included in the proposed permit.

Compliance Status:

Browning Ferris Industries of CA, Inc. initially certified that all equipment was operating in compliance on March 9, 1997. This facility underwent a change of ownership in August 1999. The new owner, Allied Waste Industries, Inc., certified that all equipment was operating in compliance on November 5, 1999. The most current compliance status for this facility is described in detail in the attached Compliance Report.

Alignment of Information in Application and Proposed Permit:

In the application (as revised on November 5, 1999), Allied Waste Industries, Inc. identified numerous applicable requirements for the S-1 Keller Canyon Landfill and S-2 Wipe Cleaning Operation. For the S-1 Keller Canyon Landfill and associated A-1 Landfill Gas Flare, Allied Waste Industries indicated that S-1 and A-1 are subject to District Regulation 6; Regulation 8, Rule 34; Regulation 9, Rule 1; 40 CFR Part 60, Subpart WWW; and District Permit Condition #14172. District staff identified several additional rules that apply to S-1 and A-2, including: District Regulation 1; Regulation 8, Rules 2 and 40; Regulation 9, Rule 2; Regulation 11, Rules 1, 3, and 14; and 40 CFR Part 60, Subpart A. Also, District Permit Condition #17309 is now applicable to S-1 and A-1 instead of Condition #14172.

For the S-2 Wipe Cleaning Operation, Allied Waste Industries indicated that S-2 is subject to District Regulation 8, Rule 16 and District Permit Condition #9527. District staff did not identify any other applicable requirements for S-2; however, the proposed permit does include a new revision of District Regulation 8, Rule 16 in addition to the SIP approved version cited by the applicant.

In addition to S-1 and S-2, a third source (S-3 Yard and Green Waste Stockpiles) that was not listed in the application materials was issued a Permit to Operate by the District on April 6, 1999. This source is subject to District Regulation 6 and District Permit Condition #16462.

All applicable requirements for S-1, A-1, S-2, and S-3, including requirements with future effective dates, have been identified in the proposed permit.

Emission Calculations:

Worst case emissions will occur when landfill gas has a low methane content and low heat content. The following emission calculations assume that the landfill gas contains 45% methane and has a heat content of 450 BTU/scf of landfill gas. For landfill gas containing 45% methane, the amount of flue gas generated is estimated to be 4.3949 cubic feet of flue gas per cubic foot of landfill gas at 0% excess oxygen.

PM_{10} from Flare

Emissions Allowed by the Standard in Regulation 6-310

(72.7 E6 BTU/hour)/(450 BTU/ft^3 LFG)*(4.3949 ft^3 flue/ft^3 LFG)*(0.15 grains/ft^3)/
(7000 grain/lb)*(24 hours/day)
= 365.2 lbs/day = 66.64 tons/year PM from flare (allowed)

All PM emissions are assumed to be PM_{10}.

Potential to Emit

Emission Factors from AP-42 Chapter 2.4, Table 2.4-5:
(17 lbs PM_{10}/10^6 dscf CH_4)*(0.45 scf CH_4/scf LFG)/(450 BTU/scf LFG)*(10^6 BTU/MM BTU)
= 0.017 lbs PM_{10}/MM BTU

A-1 Landfill Gas Flare Potential Emissions:
(72.7 MM BTU/hour)*(0.017 lbs PM_{10}/MM BTU)*(24 hours/day)
= 29.66 lbs PM_{10}/day = 5.41 tons/year PM_{10} from flare (potential)

The ratio of allowable emissions to potential emissions is 12.3 to 1. Therefore, the margin of compliance is high. While it is true that the quality of the AP-42 emission factor is "E", it is presumed that the emission factor contains condensable particulate matter, while the District standard does not. Therefore, the margin of compliance is higher by an unknown quantity.

SO_2 from Flare

Emissions Allowed by Standard in Regulation 9-1-302

As shown below, the federally enforceable emission limit of 300 ppmv of SO_2 in the exhaust gas (BAAQMD Regulation 9-1-302) is equivalent to a total reduced sulfur concentration of 1318 ppmv in the landfill gas. This concentration was rounded down to 1300 ppmv of TRS to establish a federally enforceable concentration limit.

(300 E-6 ft^3 SO_2/ft^3 flue gas)*(4.3949 ft^3 flue/ft^3 LFG)*(1 ft^3 S/1 ft^3 SO_2)*(1 ft^3 H_2S/1 ft^3 S)*(10^6)
= 1318.5 ppmv of total reduced sulfur (TRS) as H_2S in landfill gas

A concentration limit of 1300 ppmv of TRS in the landfill gas will be used as a surrogate for the 300 ppmv SO_2 limit in the combustion gases.

(72.7 E6 BTU/hour)/(450 BTU/ft^3 LFG)*(1300 E-6 ft^3 S/ft^3 LFG)*(1 ft^3 SO_2/1 ft^3 S)/
(386.8 ft^3 SO_2/lbmol SO_2)*(64.06 lbs SO_2/lbmol SO_2)*(24 hours/day)
= 834.8 pounds/day SO_2 = 152.35 tons/year SO_2 from flare (allowed)

Potential to Emit

Although the federally enforceable concentration limit is 1300 ppmv of TRS, the maximum amount of TRS detected in any Bay Area landfill is 350 ppmv. Using a statistical analysis on the available data, Bay Area landfill gas is determined to contain no more than 400 ppmv of TRS. This worst case concentration (400 ppmv of TRS) will be used to calculate the maximum potential sulfur dioxide emissions, instead of the federally enforceable concentration limit (1300 ppmv of TRS).

(72.7 E6 BTU/hour)/(450 BTU/ft^3 LFG)*(400 E-6 ft^3 S/ft^3 LFG)*(1 ft^3 SO_2/1 ft^3 S)/
(386.8 ft^3 SO_2/lbmol SO_2)*(64.06 lbs SO_2/lbmol SO_2)*(24 hours/day)
= 256.9 pounds/day SO_2 = 46.88 tons/year SO_2 from flare (potential)

Expected Emissions

A District source test indicated a sulfur content of 51.3 ppmv of TRS for landfill gas collected from the Keller Canyon Landfill.

(72.7 E6 BTU/hour)/(450 BTU/ft^3 LFG)*(51.3 E-6 ft^3 S/ft^3 LFG)*(1 ft^3 SO_2/1 ft^3 S)/
(386.8 ft^3 SO_2/lbmol SO_2)*(64.06 lbs SO_2/lbmol SO_2)*(24 hours/day)
= 32.94 pounds/day SO_2 = 6.01 tons/year SO_2 from flare (expected)

The ratio of allowable emissions to potential emissions is 3.2 to 1 and the ratio of allowable emissions to expected emissions is 25.3 to 1. Therefore, the margin of compliance is very high.

APPENDIX A

POTENTIAL TO EMIT CALCULATIONS FOR LEAD EMISSIONS

(Including calculations of emissions due to stockpiling, truck loading and wind erosion)

Lead Emissions due to Handling and Disposal of Lead Contaminated Soil at Landfills

Worst Case PM Emissions	Pounds/Year	
	TSP	PM10
Stockpiling and Truck Transfers	749	354
Wind Erosion	106172	53086
Total PM Emissions	106921	53440
Worst Case Lead Emissions	Pounds/Year	
	TSP	PM10
Stockpiling and Truck Transfers	0.26	0.12
Wind Erosion	37.16	18.58
Total Annual Lead Emissions	37.42	18.70
	Pounds/Day	
Total Daily Lead Emissions	0.10	0.05

Above emissions are based on worst case assumptions for all equation variables and are therefore expected to be an over-estimate of emissions.

PM Emissions after Control	Pounds/Year	
	TSP	PM10
Stockpiling and Truck Transfers	41	19
Wind Erosion	25099	12549
Total PM Emissions	25139	12569
Lead Emissions after Control	Pounds/Year	
	TSP	PM10
Stockpiling and Truck Transfers	0.01	0.01
Wind Erosion	8.78	4.39
Total Annual Lead Emissions	8.80	4.40
	Pounds/Day	
Total Daily Lead Emissions	0.02	0.01

Above emissions are based on the use of regular watering to control dust emissions.

Lead Concentration Estimate:

(0.10 lbs/day)/(24 hours/day)/(2 miles/hour)/(5280 feet/mile)/(50000 ft^2)*(35.315 ft^3/m^3)*(4.536E8 μg/lb)
= 0.13 $\mu g/m^3$

Particulate Emissions Due to Stockpiling and Truck Loading

From AP-42 Chapter 13.2.4 Aggregate Handling and Storage Piles
Emission Factor Equation (1) for Each Material Transfer, page 13.2.4-3

E = k * (0.0032) * (U/5)^1.3 / (M/2)^1.4 = lbs particulates / ton transferred

Worst Case Emissions:

	Particle Size				
	< 30 µm	< 15 µm	< 10 µm	< 5 µm	< 2.5 µm
k, particle size multiplier	0.74	0.48	0.35	0.20	0.11
U, wind speed, mph [1]	15	15	15	15	15
M, moisture content % [2]	0.25	0.25	0.25	0.25	0.25
E, emission factor, lbs/ton	0.1815	0.1178	0.0859	0.0491	0.0270
Soil Transferred, tons	2063	2063	2063	2063	2063
Max. Lead Concentration in Soil, (ppmw)	350	350	350	350	350
PM Emissions/Transfer	374.4	242.9	177.1	101.2	55.7
Number of Transfers (to stockpile, to truck)	2	2	2	2	2
PM Emissions due to Transfers, pounds	748.8	485.7	354.2	202.4	111.3
Lead Emissions due to Transfers, pounds	0.262	0.170	0.124	0.071	0.039

1. The applicable wind speed range for the above equation is 1.3 mph to 15 mph. The highest of the applicable range was used to obtain worst case emissions.
2. The applicable moisture range for the above equations is 0.25% to 4.8%. The lowest of the applicable range was used to obtain worst case emissions.

Particulate Emissions Due to Stockpiling and Truck Loading (continued)

Typical Emissions:					
	Particle Size				
	< 30 μm	< 15 μm	< 10 μm	< 5 μm	< 2.5 μm
k, particle size multiplier	0.74	0.48	0.35	0.20	0.11
U, wind speed, mph [1]	15	15	15	15	15
M, moisture content % [2]	2	2	2	2	2
E, emission factor, lbs/ton	0.0099	0.0064	0.0047	0.0027	0.0015
Soil Transferred, tons	2063	2063	2063	2063	2063
Max. Lead Concentration in Soil, (ppmw)	350	350	350	350	350
PM Emissions/Transfer	20.4	13.2	9.6	5.5	3.0
Number of Transfers (to stockpile, to truck)	2	2	2	2	2
PM Emissions due to Transfers, pounds	40.7	26.4	19.3	11.0	6.1
Lead Emissions due to Transfers, pounds	0.014	0.009	0.007	0.004	0.002

1. The applicable wind speed range for the above equation is 1.3 mph to 15 mph. The highest of the applicable range was used to obtain worst case emissions.
2. The applicable moisture range for the above equations is 0.25% to 4.8%. An average soil moisture content of 2% was assumed, because the operator will use regular watering to control dust emissions.

AP-42 Chapter 13.2.5 Industrial Wind Erosion

E = emission factor, g/m^2
k = particle size multiplier
N = number of disturbances per year
P_i = erosion potential, g/m^2
u* = fiction velocity, m/s
u_t* = threshold friction velocity, m/s From Tables 13.2.5-1 and 13.2.5-2, u_t* ranges from 0.43 to 1.33 m/s.
u_{10}^+ = fastest mile of wind, m/s, at reference anemometer height of 10 m. Assume u_{10}^+ = 40 mph (17.88 m/s)

$$u^* = 0.053 * u_{10}^+$$

$$P_i = 58*(u^* - u_t^*)^2 + 25*(u^* - u_t^*)$$

$$E = k * \sum_{i=1}^{N} P_i$$

u_{10}^+ = 17.88
u* = 0.95
u_t* = 0.43 (worst case)
P_i = 28.48
N = 364 (7 days/week, 52 weeks/year)

	Particle Size					
	< 30 µm	< 15 µm	< 10 µm	< 2.5 µm		
k =	1.0	0.6	0.5	0.2		
E =	10367.51	6220.51	5183.75	2073.50		
Area, m^2	4645	4645	4645	4645	(assume 50,000 ft^2)	
PM Emissions						
grams/year	48158656	28895193	24079328	9631731		
pounds/year	106172	63703	53086	21234		
Lead Emissions						
ppmw in soil	350	350	350	350		
pounds/year	37.160	22.296	18.580	7.432		

AP-42 Chapter 13.2.5 Industrial Wind Erosion (continued)

u_{10}^{+} = 17.88
U* = 0.95
U_t* = 0.76 (estimate for watered soil)
P_i = 6.73
N = 364 (7 days/week, 52 weeks/year)

	Particle Size					
	< 30 µm	< 15 µm	< 10 µm	< 2.5 µm		
k =	1.0	0.6	0.5	0.2		
E =	2450.85	1470.51	1225.43	490.17		
Area, m^2	4645	4645	4645	4645	(assume 50,000 ft2)	
PM Emissions						
grams/year	11384578	6830747	5692289	2276916		
pounds/year	25099	15059	12549	5020		
Lead Emissions						
ppmw in soil	350	350	350	350		
pounds/year	8.785	5.271	4.392	1.757		