

Title V Permit Evaluation

Site Number: A2254

Site Name: Sonoma County Central Landfill

Site Address: 500 Mecham Road, Petaluma, CA 94952

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 Sonoma County Central Landfill	BAAQMD 8-34-303a (expires 7/1/02) and SIP 8-34-303	1000 ppmv as methane at 3 inches above landfill surface	37 TPY of POC currently and 58 TPY of POC max (estimated from Initial Design Capacity and NMOC Emission Rate Reports)	BAAQMD 8-34-506 requires quarterly inspections for surface emissions beginning no later than 10/1/02 and BAAQMD 8-34-510 requires visual cover inspections beginning no later than 8/1/02

Lead: S-1

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

Particulate Matter: S-4, S-5, S-6, S-7, S-9, S-10, S-11, S-12, and A-2

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-4, S-5, S-6, S-7, S-8, S-9, S-10, and S-12 Internal Combustion Engines And A-2 Landfill Gas Flare	BAAQMD 6-301	Ringelmann 1	1.82 TPY (each engine) 3.88 TPY (from flare) 14.48 tons/year (worst case, which is all 8 engines running at all times and no flare operation)	Not Recommended
S-4, S-5, S-6, S-7, S-8, S-9, S-10, and S-12 Internal Combustion Engines And A-2 Landfill Gas Flare	BAAQMD 6-310	0.15 grains/dscf	1.82 TPY (each engine) 3.88 TPY (from flare) 14.48 tons/year (worst case, which is all 8 engines running at all times and no flare operation)	Not Recommended

Sulfur Dioxide: S-4, S-5, S-6, S-7, S-9, S-10, S-11, S-12, and A-2

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-4, S-5, S-6, S-7, S-8, S-9, S-10, and S-12 Internal Combustion Engines And A-2 Landfill Gas Flare	BAAQMD 9-1-301	Property line ground level limits ≤ 0.50 ppm for 3 minutes ≤ 0.25 ppm for 60 minutes ≤ 0.05 ppm for 24 hours	5.55 TPY (each engine) 33.59 TPY (from flare) 44.40 TPY (worst case combined, from all 8 engines)	Not Recommended

Nitrogen Oxides: S-4, S-5, S-6, S-7, S-9, S-10, S-11, S-12

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-4, S-5, S-6, S-7, S-8, S-9, S-10, and S-12 Internal Combustion Engines	BAAQMD 9-8-301.2	Fossil Fuel Gas, Lean-Burn 140 ppmv @ 15% O ₂	N/A	Not Recommended

Carbon Monoxide: S-4, S-5, S-6, S-7, S-9, S-10, S-11, S-12

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-4, S-5, S-6, S-7, S-8, S-9, S-10, and S-12 Internal Combustion Engines	BAAQMD 9-8-301.3	Fossil Fuel Gas, Lean-Burn 2000 ppmv @ 15% O ₂	N/A	Not Recommended

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

Discussion

S-1: Sonoma County Central Landfill

TOC: Surface leaks of total organic compounds (TOC) from the S-1 Sonoma County Central Landfill are currently limited to 1000 ppmv as methane. This limit will expire on 7/1/02 and be replaced by a more stringent limit of 500 ppmv as methane. New quarterly surface emissions monitoring and monthly cover integrity monitoring requirements will become effective on 7/1/02, in conjunction with the change to the surface leak limit. Implementation of the surface emission and cover monitoring plans requires a long lead time for preparing monitoring plans, obtaining District approval, purchasing equipment and/or engaging in contracts with testing companies. This facility is currently preparing a monitoring plan as part of their Collection and Control System Design Plan. BAAQMD Regulation 8-34-408 requires this plan to be submitted to the District by December 31, 2000. Because of the long lead time issues discussed above, the surface emissions and cover integrity monitoring plans could not be implemented any sooner than the scheduled effective date of 7/1/02. Therefore, no monitoring is

recommended for the interim TOC surface emission limit of 1000 ppmv as methane.

Lead: The Sonoma County Central 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 $\mu\text{g}/\text{m}^3$ averaged over 24 hours.

Worst case lead emissions were calculated using AP-42 emission factor equations (see attached) 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.

S-4, S-5, S-6, S-7, S-9, S-10, S-12: Internal Combustion Engines

PM: Particulate emissions from lean-burn internal combustion engines fired on landfill gas are expected to be similar to engines burning natural gas. AP-42 emission factors for these two fuels are 0.046 pounds of PM_{10} per MM BTU for natural gas and 0.048 pounds PM_{10} per MM BTU for landfill gas. As with natural gas combustion, visible emissions are not normally associated with the proper combustion of landfill gas. Therefore, periodic monitoring for Ringelmann limits would not be appropriate for these engines.

Using the above AP-42 emission factor for landfill gas combustion and a worst case landfill gas heat content of 450 BTU/scf, the particulate emission rate from the engines is expected to be 0.034 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.

SO₂: 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 SO₂ 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 58 ppmv. At 58 ppmv of TRS, maximum SO₂

emissions are 0.80 tons/year of SO₂ from each engine and 6.44 tons/year of SO₂ from all eight engines combined. Monitoring for ground level SO₂ concentrations in addition to the proposed landfill gas monitoring would not be appropriate for such low levels of SO₂ emissions.

NO_x: These engines are allowed to burn natural gas in addition to landfill gas, provided that natural gas usage does not replace any landfill gas. As a result, these engines are subject to BAAQMD and SIP Regulation 9-8-301.2 for fossil fuels, in addition to 9-8-302.1 for waste gas fuels. However, the two NO_x limits are the same. If natural gas were to be burned in these engines, it would be mixed in small amounts with landfill gas to boost the BTU value of the fuel. Such natural gas usage is not expected to have any measurable affect on NO_x emissions.

The facility will be required to perform annual tests on each engine to ensure compliance with the waste gas NO_x emission limit. Due to the infrequent use of natural gas at these engines, requiring an additional test for compliance with 9-8-301.2 would not be appropriate.

CO: As described above for NO_x, these engines are subject to BAAQMD and SIP Regulation 9-8-301.3 for fossil fuels, in addition to 9-8-302.3 for waste gas fuels. The two CO limits are also same. Natural gas usage is not expected to have any measurable affect on CO emissions. The facility will be required to perform annual tests on each engine to ensure compliance with the waste gas CO emission limit. Due to the infrequent use of natural gas at these engines, requiring an additional test for compliance with 9-8-301.3 would not be appropriate.

A-2: Landfill Gas Flare

PM: As described above for the engines, 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.

SO₂: As described above for the engines, SO₂ emissions from the flare are expected to be much lower than the maximum potential to emit. At 58 ppmv of TRS, SO₂ emissions from the flare are expected to be no more than are 4.87 tons/year. Monitoring for ground level SO₂ concentrations in addition to the proposed landfill gas monitoring for total reduced sulfur content would not be appropriate for such low levels of SO₂ emissions.

Permit Shield:

No permit shield was requested.

Alternate Operating Scenario:

The Sonoma County Central Landfill (S-1) is equipped with an active landfill gas collection system. Under normal operating conditions the collection system operates continuously and, all of the collected

landfill gas is vented to control devices. Typically the landfill gas is vented to the eight Internal Combustion Engines (S-4, S-5, S-6, S-7, S-9, S-10, S-11, and S-12). When one or more engines are shut down, some of the collected landfill gas is vented to the A-2 Landfill Gas Flare in addition to the remaining operational engines.

In their application, Sonoma County Central Landfill described the venting of landfill gas to the flare as an alternative operating scenario. However, the District considers this procedure to be part of normal operations. Sonoma County must ensure that all collected landfill gas is continuously controlled in order to maintain compliance with District Regulations. However, Sonoma County must shut down engines periodically to perform routine maintenance. With eight engines all requiring periodic maintenance, the flare is required to be operated fairly frequently. In 1999, Sonoma County reported that 42% of the collected landfill gas was burned in the flare. Therefore, venting to the flare is part of normal or routine operations.

All applicable requirements, compliance and monitoring provisions, and test methods for both the engines and the flare are contained in the proposed permit, and the proposed permit does not contain any alternative operating scenarios.

Compliance Status:

On December 22, 1995, Sonoma County Central Landfill certified that all equipment was operating in compliance. No non-compliance issues have been identified to date.

Alignment of Information in Application and Proposed Permit:

In the application, Sonoma County Central Landfill identified only two District Regulations (Regulation 6 and Regulation 8, Rule 34) and a Conditional Order for Abatement (Docket #2656) on their Applicable Requirements and Compliance Summary Form. District staff identified numerous other District rules that apply to this facility, such as: Regulation 1; Regulation 8, Rules 2 and 40; Regulation 9, Rules 1, 2, and 8; and Regulation 11, Rule 1, 3, and 14. In addition, federal regulations that were adopted after this application was submitted contain requirements that will be applicable to this facility in the future. The federal regulations that contain applicable requirements include 40 CFR Part 60, Subparts A, Cc, and WWW and 40 CFR Part 62, Subpart GGG. All applicable requirements, 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.

PM₁₀ from Engines and Flare

Emissions Allowed by the Standard in Regulation 6-310

Engines:

$$\begin{aligned} & (8.61 \text{ E6 BTU/hour/engine}) / (450 \text{ BTU/ft}^3 \text{ LFG}) * (4.3949 \text{ ft}^3 \text{ flue/ft}^3 \text{ LFG}) * \\ & (0.15 \text{ grains/ft}^3) / (7000 \text{ grain/lb}) * (24 \text{ hours/day}) \\ & = 43.25 \text{ lbs/day/engine} = 7.89 \text{ tons/year PM per engine} \\ & (7.89 \text{ tons/year/engine}) * (8 \text{ engines}) = 63.14 \text{ tons/year PM from all engines combined} \end{aligned}$$

Flare:

$$\begin{aligned} & (52.1 \text{ MM BTU/hour/flare}) / (450 \text{ BTU/ft}^3 \text{ LFG}) * (4.3949 \text{ ft}^3 \text{ flue/ft}^3 \text{ LFG}) * \\ & (0.15 \text{ grains/ft}^3) / (7000 \text{ grain/lb}) * (24 \text{ hours/day}) \\ & = 261.68 \text{ lbs/day/flare} = 47.76 \text{ tons/year PM from flare} \end{aligned}$$

All PM emissions are assumed to be PM₁₀.

Potential to Emit

Emission Factors from AP-42 Chapter 2.4, Table 2.4-5:

$$\begin{aligned} \text{Engine:} & \quad (48 \text{ lbs PM}_{10}/10^6 \text{ dscf methane}) * (0.45 \text{ scf methane/scf LFG}) / (450 \text{ BTU/scf LFG}) \\ & = 0.048 \text{ lbs PM}_{10}/\text{MM BTU} \\ \text{Flare:} & \quad (17 \text{ lbs PM}_{10}/10^6 \text{ dscf methane}) * (0.45 \text{ scf methane/scf LFG}) / (450 \text{ BTU/scf LFG}) \\ & = 0.017 \text{ lbs PM}_{10}/\text{MM BTU} \end{aligned}$$

For comparison, AP-42 sites PM₁₀ emissions from a 2-stroke, lean-burn, natural gas fired engine as 0.046 lbs PM₁₀/MM BTU.

Engines:

$$\begin{aligned} & (8.61 \text{ MM BTU/hour/engine}) * (0.048 \text{ lbs PM}_{10}/\text{MM BTU}) * (24 \text{ hours/day}) \\ & = 9.92 \text{ lbs PM}_{10}/\text{day/engine} = 1.82 \text{ tons/year PM}_{10} \text{ per engine} \\ & (1.82 \text{ tons/yr/engine}) * (8 \text{ engines}) = 14.48 \text{ tons/year PM}_{10} \text{ from all engines combined} \end{aligned}$$

Flare:

$$\begin{aligned} & (52.1 \text{ MM BTU/hour/flare}) * (0.017 \text{ lbs PM}_{10}/\text{MM BTU}) * (24 \text{ hours/day}) \\ & = 21.26 \text{ lbs PM}_{10}/\text{day/flare} = 3.88 \text{ tons/year PM}_{10} \text{ from flare} \end{aligned}$$

The ratio of allowable emissions to potential emissions is 4.4 to 1 for the engines and 12.3 to 1 for the flare. 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.

SO₂ from Engines and Flare

Emissions Allowed by Standard in Regulation 9-1-302

As shown below, the federally enforceable emission limit of 300 ppmv of SO₂ 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.

$$(300 \text{ E-6 ft}^3 \text{ SO}_2/\text{ft}^3 \text{ flue gas}) * (4.3949 \text{ ft}^3 \text{ flue}/\text{ft}^3 \text{ LFG}) * (1 \text{ ft}^3 \text{ S}/1 \text{ ft}^3 \text{ SO}_2) * (1 \text{ ft}^3 \text{ H}_2\text{S}/1 \text{ ft}^3 \text{ S}) * (10^6) \\ = 1318.5 \text{ ppmv of total reduced sulfur (TRS) as H}_2\text{S in landfill gas}$$

A concentration limit of 1300 ppmv of TRS in the landfill gas will be used as a surrogate for the 300 ppmv SO₂ limit in the combustion gases.

Engines:

$$(8.61 \text{ E6 BTU}/\text{hour}/\text{engine}) / (450 \text{ BTU}/\text{ft}^3 \text{ LFG}) * (1300 \text{ E-6 ft}^3 \text{ S}/\text{ft}^3 \text{ LFG}) * (1 \text{ ft}^3 \text{ SO}_2/1 \text{ ft}^3 \text{ S}) / \\ (386.8 \text{ ft}^3 \text{ SO}_2/\text{lbmol SO}_2) * (64.06 \text{ lbs SO}_2/\text{lbmol SO}_2) * (24 \text{ hours}/\text{day}) \\ = 98.87 \text{ pounds}/\text{day SO}_2 \text{ per engine} = 18.04 \text{ tons}/\text{year SO}_2 \text{ per engine} \\ (18.04 \text{ tons}/\text{year}/\text{engine}) * (8 \text{ engines}) = 144.34 \text{ tons}/\text{year SO}_2 \text{ from all engines combined}$$

Flare:

$$(52.1 \text{ E6 BTU}/\text{hour}/\text{flare}) / (450 \text{ BTU}/\text{ft}^3 \text{ LFG}) * (1300 \text{ E-6 ft}^3 \text{ S}/\text{ft}^3 \text{ LFG}) * (1 \text{ ft}^3 \text{ SO}_2/1 \text{ ft}^3 \text{ S}) / \\ (386.8 \text{ ft}^3 \text{ SO}_2/\text{lbmol SO}_2) * (64.06 \text{ lbs SO}_2/\text{lbmol SO}_2) * (24 \text{ hours}/\text{day}) \\ = 598.25 \text{ pounds}/\text{day SO}_2 \text{ from flare} = 109.18 \text{ tons}/\text{year SO}_2 \text{ from flare}$$

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).

Engines:

$$\begin{aligned} & (8.61 \text{ E6 BTU/hour/engine}) / (450 \text{ BTU/ft}^3 \text{ LFG}) * (400 \text{ E-6 ft}^3 \text{ S/ft}^3 \text{ LFG}) * (1 \text{ ft}^3 \text{ SO}_2 / 1 \text{ ft}^3 \text{ S}) / \\ & (386.8 \text{ ft}^3 \text{ SO}_2 / \text{lbmol SO}_2) * (64.06 \text{ lbs SO}_2 / \text{lbmol SO}_2) * (24 \text{ hours/day}) \\ & = 30.42 \text{ pounds/day SO}_2 \text{ per engine} = 5.55 \text{ tons/year SO}_2 \text{ per engine} \\ & (5.55 \text{ tons/year/engine}) * (8 \text{ engines}) = 44.40 \text{ tons/year SO}_2 \text{ from all engines combined} \end{aligned}$$

Flare:

$$\begin{aligned} & (52.1 \text{ E6 BTU/hour/flare}) / (450 \text{ BTU/ft}^3 \text{ LFG}) * (400 \text{ E-6 ft}^3 \text{ S/ft}^3 \text{ LFG}) * (1 \text{ ft}^3 \text{ SO}_2 / 1 \text{ ft}^3 \text{ S}) / \\ & (386.8 \text{ ft}^3 \text{ SO}_2 / \text{lbmol SO}_2) * (64.06 \text{ lbs SO}_2 / \text{lbmol SO}_2) * (24 \text{ hours/day}) \\ & = 184.08 \text{ pounds/day SO}_2 \text{ from flare} = 33.59 \text{ tons/year SO}_2 \text{ from flare} \end{aligned}$$

Expected Emissions

A District source test indicated a sulfur content of 58 ppmv of TRS for landfill gas collected from the Sonoma County Central Landfill.

Engines:

$$\begin{aligned} & (8.61 \text{ E6 BTU/hour/engine}) / (450 \text{ BTU/ft}^3 \text{ LFG}) * (58 \text{ E-6 ft}^3 \text{ S/ft}^3 \text{ LFG}) * (1 \text{ ft}^3 \text{ SO}_2 / 1 \text{ ft}^3 \text{ S}) / \\ & (386.8 \text{ ft}^3 \text{ SO}_2 / \text{lbmol SO}_2) * (64.06 \text{ lbs SO}_2 / \text{lbmol SO}_2) * (24 \text{ hours/day}) \\ & = 4.41 \text{ pounds/day SO}_2 \text{ per engine} = 0.80 \text{ tons/year SO}_2 \text{ per engine} \\ & (0.805 \text{ tons/year/engine}) * (8 \text{ engines}) = 6.44 \text{ tons/year SO}_2 \text{ from all engines combined} \end{aligned}$$

Flare:

$$\begin{aligned} & (52.1 \text{ E6 BTU/hour/flare}) / (450 \text{ BTU/ft}^3 \text{ LFG}) * (58 \text{ E-6 ft}^3 \text{ S/ft}^3 \text{ LFG}) * (1 \text{ ft}^3 \text{ SO}_2 / 1 \text{ ft}^3 \text{ S}) / \\ & (386.8 \text{ ft}^3 \text{ SO}_2 / \text{lbmol SO}_2) * (64.06 \text{ lbs SO}_2 / \text{lbmol SO}_2) * (24 \text{ hours/day}) \\ & = 26.69 \text{ pounds/day SO}_2 \text{ from flare} = 4.87 \text{ tons/year SO}_2 \text{ from flare} \end{aligned}$$

The ratio of allowable emissions to expected emissions is 22.4 to 1 for both the engines and the flare. Therefore, the margin of compliance is very high.

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^* = friction velocity, m/s
- u_t^* = threshold friction velocity, m/s From Tables 13.2.5-1 and 13.2.5-2
- u_{10}^+ = fastest mile of wind, m/s, at reference anemometer height of 10 m.

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

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

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

- $u_{10}^+ = 17.88$
- $u^* = 0.95$
- $u_t^* = 0.43$ (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	

- $u_{10}^+ = 17.88$
- $u^* = 0.95$
- $u_t^* = 0.76$ (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 ft^2)
PM Emissions					
grams/year	11384578	6830747	5692289	2276916	
pounds/year	25099	15059	12549	5020	
Lead Emissions					

