2.5 Open Burning

2.5.1 General[1]

Open burning can be done in open drums or baskets, in fields and yards, and in large open dumps or pits. Materials commonly disposed of in this manner include municipal waste, auto body components, landscape refuse, agricultural field refuse, wood refuse, bulky industrial refuse, and leaves.

Current regulations prohibit open burning of hazardous waste. One exception is for open burning and detonation of explosives, particularly waste explosives that have the potential to detonate, and bulk military propellants which cannot safely be disposed of through other modes of treatment.

The following Source Classification Codes (SCCs) pertain to open burning:

Government

5-01-002-01	General Refuse
5-01-002-02	Vegetation Only

Commercial/Institutional

5-02-002-01	Wood
5-02-002-02	Refuse

Industrial

5-03-002-01	Wood/Vegetation/Leaves
5-03-002-02	Refuse
5-03-002-03	Auto Body Components
5-03-002-04	Coal Refuse Piles
5-03-002-05	Rocket Propellant

2.5.2 Emissions[1-22]

Ground-level open burning emissions are affected by many variables, including wind, ambient temperature, composition and moisture content of the debris burned, and compactness of the pile. In general, the relatively low temperatures associated with open burning increase emissions of particulate matter, carbon monoxide, and hydrocarbons and suppress emissions of nitrogen oxides. Emissions of sulfur oxides are a direct function of the sulfur content of the refuse.

2.5.2.1 Municipal Refuse -

Emission factors for the open burning of municipal refuse are presented in Table 2.5-1.

2.5.2.2 Automobile Components -

Emission factors for the open burning of automobile components including upholstery, belts, hoses, and tires are presented in Table 2.5-1.

Emission factors for the burning of scrap tires only are presented in Tables 2.5-2, 2.5-3, and 2.5-4. Although it is illegal in many states to dispose of tires using open burning, fires often occur at

Table 2.5-1 (Metric And English Units). EMISSION FACTORS FOR OPEN BURNING OF MUNICIPAL REFUSE

EMISSION FACTOR RATING: D

Source	Particulate	Sulfur Oxides	Carbon Monoxide	TOC[a]		Nitrogen Oxides
				Methane	Nonmethane	
Municipal Refuse[b]						
kg/Mg	8	0.5	42	6.5	15	3
lb/ton	16	1.0	85	13	30	6
Automobile Components[c]						
kg/Mg	50	Neg	62	5	16	2
lb/ton	100	Neg	125	10	32	4

[a] Data indicate that total organic compounds (TOC) emissions are approximately 25% methane, 8% other saturates, 18% olefins, 42% others (oxygenates, acetylene, aromatics, trace formaldehyde).
[b] References 2 and 7.
[c] Reference 2. Upholstery, belts, hoses, and tires burned together.

tire stockpiles and through illegal burning activities. If the emission factors presented here are used to estimate emissions from an accidental tire fire, it should be kept in mind that emissions from burning tires are generally dependent on the burn rate of the tire. A greater potential for emissions exists at lower burn rates, such as when a tire is smoldering, rather than burning out of control. In addition, the emission factors presented here for tire "chunks" are probably more appropriate than for "shredded" tires for estimating emissions from an accidental tire fire because there is likely to be more air-space between the tires in an actual fire. As discussed in Reference 21, it is difficult to estimate emissions from a large pile of tires based on these results, but emissions can be related to a mass burn rate. To use the information presented here, it may be helpful to use the following estimates: tires tested in Reference 21 weighed approximately 7 kilograms (kg) (15.4 pounds [lb]) and the volume of 1 tire is approximately 0.2 cubic meter (m^3) (7 cubic feet [ft^3]). Table 2.5-2 presents emission factors for particulate metals. Table 2.5-3 presents emission factors for polycyclic aromatic hydrocarbons (PAH), and Table 2.5-4 presents emissions for other volatile hydrocarbons. For more detailed information on this subject consult the reference cited at the end of this chapter.

2.5.2.3 Agricultural Waste -

Organic Agricultural Waste -

Organic refuse burning consists of burning field crops, wood, and leaves. Emissions from organic agricultural refuse burning are dependent mainly on the moisture content of the refuse and, in the case of the field crops, on whether the refuse is burned in a headfire or a backfire. Headfires are started at the upwind side of a field and allowed to progress in the direction of the wind, whereas backfires are started at the downwind edge and forced to progress in a direction opposing the wind.

Other variables such as fuel loading (how much refuse material is burned per unit of land area) and how the refuse is arranged (in piles, rows, or spread out) are also important in certain instances. Emission factors for open agricultural burning are presented in Table 2.5-5 as a function of refuse type and also, in certain instances, as a function of burning techniques and/or moisture content when these variables are known to significantly affect emissions. Table 2.5-5 also presents typical fuel loading values associated with each type of refuse. These values can be used, along with

Table 2.5-2 (Metric And English Units). PARTICULATE METALS EMISSION FACTORS FROM OPEN BURNING OF TIRES[a]

EMISSION FACTOR RATING: C

Tire Condition	Chunk[b]		Shredded[b]	
Pollutant	mg / kg tire	lb / 1000 tons tire	mg / kg tire	lb / 1000 tons tire
Aluminum	3.07	6.14	2.37	4.73
Antimony[c]	2.94	5.88	2.37	4.73
Arsenic[c]	0.05	0.10	0.20	0.40
Barium	1.46	2.92	1.18	2.35
Calcium	7.15	14.30	4.73	9.47
Chromium[c]	1.97	3.94	1.72	3.43
Copper	0.31	0.62	0.29	0.58
Iron	11.80	23.61	8.00	15.99
Lead[c]	0.34	0.67	0.10	0.20
Magnesium	1.04	2.07	0.75	1.49
Nickel[c]	2.37	4.74	1.08	2.15
Selenium[c]	0.06	0.13	0.20	0.40
Silicon	41.00	82.00	27.52	55.04
Sodium	7.68	15.36	5.82	11.63
Titanium	7.35	14.70	5.92	11.83
Vanadium	7.35	14.70	5.92	11.83
Zinc	44.96	89.92	24.75	49.51

[a] Reference 21.
[b] Values are weighted averages.
[c] Hazardous air pollutants listed in the *Clean Air Act.*

Table 2.5-3 (Metric And English). POLYCYCLIC AROMATIC HYDROCARBON EMISSION FACTORS FROM OPEN BURNING OF TIRES[a]

EMISSION FACTOR RATING: D

Tire Condition	Chunk[b,c]		Shredded[b,c]	
Pollutant	mg / kg tire	lb / 1000 tons tire	mg / kg tire	lb / 1000 tons tire
Acenaphthene	718.20	1436.40	2385.60	4771.20
Acenaphthylene	570.20	1140.40	568.08	1136.17
Anthracene	265.60	531.20	49.61	99.23
Benzo(A)pyrene	173.80	347.60	115.16	230.32
Benzo(B)fluoranthene	183.10	366.20	89.07	178.14
Benzo(G,H,I)perylene	36.20	72.40	160.84	321.68
Benzo(K)fluoranthene	281.80	563.60	100.24	200.48
Benz(A)anthracene	7.90	15.80	103.71	207.43
Chrysene	48.30	96.60	94.83	189.65
Dibenz(A,H)anthracene	54.50	109.00	0.00	0.00
Fluoranthene	42.30	84.60	463.35	926.69
Fluorene	43.40	86.80	189.49	378.98
Indeno(1,2,3-CD)pyrene	58.60	117.20	86.38	172.76
Naphthalene[d]	0.00	0.00	490.85	981.69
Phenanthrene	28.00	56.00	252.73	505.46
Pyrene	35.20	70.40	153.49	306.98

[a] Reference 21.
[b] 0.00 values indicate pollutant was not found.
[c] Values are weighted averages.
[d] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.5-4 (Metric And English Units). EMISSION FACTORS FOR ORGANIC COMPOUNDS FROM OPEN BURNING OF TIRES[a]

EMISSION FACTOR RATING: C

Tire Condition	Chunk[b,c]		Shredded[b,c]	
Pollutant	mg / kg tire	lb / 1000 tons tire	mg / kg tire	lb / 1000 tons tire
1,1'Biphenyl, methyl	12.71	25.42	0.00	0.00
1h Fluorene	191.27	382.54	315.18	630.37
1-Methyl naphthalene	299.20	598.39	227.87	455.73
2-Methyl naphthalene	321.47	642.93	437.06	874.12
Acenaphthalene	592.70	1185.39	549.32	1098.63
Benzaldehyde	223.34	446.68	322.05	644.10
Benzene[d]	1526.39	3052.79	1929.93	3859.86
Benzodiazine	13.12	26.23	17.43	34.87
Benzofuran	40.62	81.24	0.00	0.00
Benzothiophene	10.31	20.62	914.91	1829.82
Benzo(B)thiophene	50.37	100.74	0.00	0.00
Benzsisothiazole	0.00	0.00	151.66	303.33
Biphenyl[d]	190.08	380.16	329.65	659.29
Butadiene[d]	117.14	234.28	138.97	277.95
Cyanobenzene	203.81	407.62	509.34	1018.68
Cyclopentadiene	67.40	134.80	0.00	0.00

Table 2.5-4 (cont.).

Tire Condition	Chunk[b,c]		Shredded[b,c]	
Pollutant	mg / kg tire	lb / 1000 tons tire	mg / kg tire	lb / 1000 tons tire
Dihydroindene	9.82	19.64	30.77	61.53
Dimethyl benzene	323.58	647.16	940.91	1881.83
Dimethyl hexadiene	6.22	12.44	73.08	146.15
Dimethyl naphthalene	35.28	70.55	155.28	310.57
Dimethyldihydro indene	5.02	10.04	27.60	55.20
Ethenyl, dimethyl benzene	11.50	23.01	196.34	392.68
Ethenyl, methyl benzene	12.48	24.95	21.99	43.98
Ethenyl benzene[d]	539.72	1079.44	593.15	1186.31
Ethenyl cyclohexene	4.85	9.70	89.11	178.22
Ethenylmethyl benzene	103.13	206.26	234.59	469.19
Ethyenylmethyl benzene	0.00	0.00	42.04	84.07
Ethyl, methyl benzene	79.29	158.58	223.79	447.58
Ethyl benzene	138.94	277.87	335.12	670.24
Ethynyl, methyl benzene	459.31	918.62	345.25	690.50
Ethynyl benzene	259.82	519.64	193.49	386.98
Heptadiene	6.40	12.79	42.12	84.24
Hexahydro azepinone	64.35	128.69	764.03	1528.05

Table 2.5-4 (cont.).

Tire Condition	Chunk[b,c]		Shredded[b,c]	
Pollutant	mg / kg tire	lb / 1000 tons tire	mg / kg tire	lb / 1000 tons tire
Indene	472.74	945.48	346.23	692.47
Isocyano benzene	283.78	567.55	281.13	562.25
Isocyano naphthalene	10.75	21.51	0.00	0.00
Limonene	48.11	96.22	2309.57	4619.14
Methyl, ethenyl benzene	21.15	42.30	67.05	134.10
Methyl, methylethenyl benzene	35.57	71.13	393.78	787.56
Methyl, methylethyl benzene	109.69	219.39	1385.03	2770.07
Methyl benzaldehyde	0.00	0.00	75.49	150.98
Methyl benzene	1129.80	2259.60	1395.04	2790.08
Methyl cyclohexene	3.91	7.83	33.44	66.88
Methyl hexadiene	15.59	31.18	102.20	204.40
Methyl indene	50.04	100.07	286.68	573.36
Methyl, methylethyl benzene	11.76	23.52	114.33	228.66
Methyl naphthalene	144.78	289.56	122.68	245.37
Methyl, propyl benzene	0.00	0.00	30.14	60.28
Methyl thiophene	4.39	8.78	10.52	21.03
Methylene indene	30.37	60.75	58.91	117.82

Table 2.5-4 (cont.).

Tire Condition	Chunk[b,c]		Shredded[b,c]	
Pollutant	mg / kg tire	lb / 1000 tons tire	mg / kg tire	lb / 1000 tons tire
Methylethyl benzene	41.40	82.79	224.23	448.46
Phenol[d]	337.71	675.41	704.90	1409.80
Propenyl, methyl benzene	0.00	0.00	456.59	913.18
Propenyl naphthalene	26.80	53.59	0.00	0.00
Propyl benzene	19.43	38.87	215.13	430.26
Styrene[d]	618.77	1237.53	649.92	1299.84
Tetramethyl benzene	0.00	0.00	121.72	243.44
Thiophene	17.51	35.02	31.11	62.22
Trichlorofluoromethane	138.10	276.20	0.00	0.00
Trimethyl benzene	195.59	391.18	334.80	669.59
Trimethyl naphthalene	0.00	0.00	316.26	632.52

[a] Reference 21.
[b] 0.00 values indicate the pollutant was not found.
[c] Values are weight averages.
[d] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.5-5 (Metric And English Units). EMISSION FACTORS AND FUEL LOADING FACTORS FOR OPEN BURNING OF AGRICULTURAL MATERIALS[a]

EMISSION FACTOR RATING: D

Refuse Category	Particulate[b]		Carbon Monoxide		TOC[c]				Fuel Loading Factors (waste production)	
					Methane		Nonmethane			
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	Mg/hectare	ton/acre
Field Crops[d]										
Unspecified	11	21	58	117	2.7	5.4	9	18	4.5	2
Burning techniques not significant[e]										
Asparagus[f]	20	40	75	150	10	20	33	66	3.4	1.5
Barley	11	22	78	157	2.2	4.5	7.5	15	3.8	1.7
Corn	7	14	54	108	2	4	6	12	9.4	4.2
Cotton	4	8	88	176	0.7	1.4	2.5	5	3.8	1.7
Grasses	8	16	50	101	2.2	4.5	7.5	15		
Pineapple[g]	4	8	56	112	1	2	3	6		
Rice[h]	4	9	41	83	1.2	2.4	4	8	6.7	3.0
Safflower	9	18	72	144	3	6	10	20	2.9	1.3
Sorghum	9	18	38	77	1	2	3.5	7	6.5	2.9
Sugar cane[i]	2.3-3.5	6-8.4	30-41	60-81	0.6-2	1.2-3.8	2-6	4-12	8-46	3-17
Headfire Burning[j]										
Alfalfa	23	45	53	106	4.2	8.5	14	28	1.8	0.8
Bean (red)	22	43	93	186	5.5	11	18	36	5.6	2.5
Hay (wild)	16	32	70	139	2.5	5	8.5	17	2.2	1.0
Oats	22	44	68	137	4	7.8	13	26	3.6	1.6
Pea	16	31	74	147	4.5	9	15	29	5.6	2.5
Wheat	11	22	64	128	2	4	6.5	13	4.3	1.9

Table 2.5-5 (cont.).

Refuse Category	Particulate[b]		Carbon Monoxide		TOC[c]				Fuel Loading Factors (waste production)	
					Methane		Nonmethane			
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	Mg/hectare	ton/acre
Backfire Burning[k]										
Alfalfa	14	29	60	119	4.5	9	14	29	1.8	0.8
Bean (red)	7	14	72	148	3	6	10	19	5.6	2.5
Hay (wild)	8	17	75	150	2	4	6.5	13	2.2	1.0
Oats	11	21	68	136	2	4	7	14	3.6	1.6
Wheat	6	13	54	108	1.3	2.6	4.5	9	4.3	1.9
Vine Crops	3	5	26	51	0.8	1.7	3	5	5.6	2.5
Weeds										
Unspecified	8	15	42	85	1.5	3	4.5	9	7.2	3.2
Russian thistle (tumbleweed)	11	22	154	309	0.2	0.5	0.8	1.5	0.2	0.1
Tales (wild reeds)	3	5	17	34	3.2	6.5	10	21		
Orchard Crops[d,l,m]										
Unspecified	3	6	26	52	1.2	2.5	4	8	3.6	1.6
Almond	3	6	23	46	1	2	3	6	3.6	1.6
Apple	2	4	21	42	0.5	1	1.5	3	5.2	2.3
Apricot	3	6	24	49	1	2	3	6	4	1.8
Avocado	10	21	58	116	3.8	7.5	12	25	3.4	1.5
Cherry	4	8	22	44	1.2	2.5	4	8	2.2	1.0
Citrus (orange, lemon)	3	6	40	81	1.5	3	5	9	2.2	1.0
Date palm	5	10	28	56	0.8	1.7	3	5	2.2	1.0
Fig	4	7	28	57	1.2	2.5	4	8	4.9	2.2
Nectarine	2	4	16	33	0.5	1	1.5	3	4.5	2.0

Table 2.5-5 (cont.).

Refuse Category	Particulate[b]		Carbon Monoxide		TOC[c]				Fuel Loading Factors (waste production)	
					Methane		Nonmethane			
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	Mg/hectare	ton/acre
Orchard Crops[d,l,m]										
Olive	6	12	57	114	2	4	7	14	2.7	1.2
Peach	3	6	21	42	0.6	1.2	2	4	5.6	2.5
Pear	4	9	28	57	1	2	3.5	7	5.8	2.6
Prune	2	3	24	47	1	2	3	6	2.7	1.2
Walnut	3	6	24	47	1	2	3	6	2.7	1.2
Forest Residues[n]										
Unspecified	8	17	70	140	2.8	5.7	9	19	157	70
Hemlock, Douglas fir, cedar[p]	2	4	45	90	0.6	1.2	2	4	ND	ND
Ponderosa pine[q]	6	12	98	195	1.7	3.3	5.5	11	ND	ND

[a] Expressed as weight of pollutant emitted per weight of refuse material burned. ND = no data.

[b] Reference 12. Particulate matter from most agricultural refuse burning has been found to be in the submicrometer size range.

[c] Data indicate that total organic compound (TOC) emissions average 22% methane, 7.5% other saturates, 17% olefins, 15% acetylene, 38.5% unidentified. Unidentified TOCs are expected to include aldehydes, ketones, aromatics, cycloparaffins.

[d] References 12-13 for emission factors, Reference 14 for fuel loading factors.

[e] For these refuse materials, no significant difference exists between emissions from headfiring and backfiring.

[f] Factors represent emissions under typical high moisture conditions. If ferns are dried to <15% moisture, particulate emissions will be reduced by 30%, CO emissions 23%, TOC emissions 74%.

[g] Reference 11. When pineapple is allowed to dry to <20% moisture, as it usually is, firing technique is not important. When headfired at 20% moisture, particulate emissions will increase to 11.5 kg/Mg (23 lb/ton) and TOCs will increase to 6.5 kg/Mg (13 lb/ton).

[h] Factors are for dry (15% moisture) rice straw. If rice straw is burned at higher moisture levels, particulate emissions will increase to 14.5 kg/Mg (29 lb/ton), CO emissions to 80.5 kg/Mg (181 lb/ton), and VOC emissions to 11.5 kg/Mg (23 lb/ton).

[i] Reference 20. See Section 8.12 for discussion of sugar cane burning. The following fuel loading factors are to be used in the corresponding states: Louisiana, 8 - 13.6 Mg/hectare (3 - 5 ton/acre); Florida, 11 - 19 Mg/hectare (4 - 7 ton/acre); Hawaii, 30 - 48 Mg/hectare (11 - 17 ton/acre). For other areas, values generally increase with length of growing season. Use larger end of the emission factor range for lower loading factors.

Table 2.5-5 (cont.).

[j] See text for definition of headfiring.

[k] See text for definition of backfiring. This category, for emission estimation purposes, includes another technique used occasionally to limit emissions, called into-the-wind striplighting, which is lighting fields in strips into the wind at 100 - 200 meter (300 - 600 feet) intervals.

[l] Orchard prunings are usually burned in piles. There are no significant differences in emissions between burning a "cold pile" and using a roll-on technique, where prunings are bulldozed onto the embers of a preceding fire.

[m] If orchard removal is the purpose of a burn, 66 Mg/hectare (30 ton/acre) of waste will be produced.

[n] Reference 10. NO_X emissions estimated at 2 kg/Mg (4 lb/ton).

[p] Reference 15.

[q] Reference 16.

the corresponding emission factors, to estimate emissions from certain categories of agricultural burning when the specific fuel loadings for a given area are not known.

Emissions from leaf burning are dependent upon the moisture content, density, and ignition location of the leaf piles. Increasing the moisture content of the leaves generally increases the amount of carbon monoxide, hydrocarbon, and particulate emissions. Carbon monoxide emissions decrease if moisture content is high but increase if moisture content is low. Increasing the density of the piles increases the amount of hydrocarbon and particulate emissions, but has a variable effect on carbon monoxide emissions.

The highest emissions from open burning of leaves occur when the base of the leaf pile is ignited. The lowest emissions generally arise from igniting a single spot on the top of the pile. Particulate, hydrocarbon, and carbon monoxide emissions from windrow ignition (piling the leaves into a long row and igniting one end, allowing it to burn toward the other end) are intermediate between top and bottom ignition. Emission factors for leaf burning are presented in Table 2.5-6. For more detailed information on this subject, the reader should consult the reference cited at the end of this section.

2.5.2.4 Agricultural Plastic Film -

Agricultural plastic film that has been used for ground moisture and weed control. Large quantities of plastic film are commonly disposed of when field crops are burned. The plastic film may also be gathered into large piles and burned separately or burned in an air curtain. Emissions from burning agricultural plastic are dependent on whether the film is new or has been exposed to exposed to vegetation and possibly pesticides. Table 2.5-7 presents emission factors for organic compounds emitted from burning new and used plastic film in piles or in piles where air has been forced through them to simulate combustion in an air curtain. Table 2.5-8 presents emission factors for PAHs emitted from open burning of inorganic plastic film.

Table 2.5-6 (Metric And English Units). EMISSION FACTORS FOR LEAF BURNING[a]

EMISSION FACTOR RATING: D

Leaf Species	Particulate[b]		Carbon Monoxide		TOC[c]			
					Methane		Nonmethane	
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
Black Ash	18	36	63.5	127	5.5	11	13.5	27
Modesto Ash	16	32	81.5	163	5	10	12	24
White Ash	21.5	43	57	113	6.5	13	16	32
Catalpa	8.5	17	44.5	89	2.5	5	6.5	13
Horse Chestnut	27	54	73.5	147	8	17	20	40
Cottonwood	19	38	45	90	6	12	14	28
American Elm	13	26	59.5	119	4	8	9.5	19
Eucalyptus	18	36	45	90	5.5	11	13.5	27
Sweet Gum	16.5	33	70	140	5	10	12.5	25
Black Locust	35	70	65	130	11	22	26	52
Magnolia	6.5	13	27.5	55	2	4	5	10
Silver Maple	33	66	51	102	110	20	24.5	49
American Sycamore	7.5	15	57.5	115	2.5	5	5.5	11
California Sycamore	5	10	52	104	1.5	3	3.5	7
Tulip	10	20	38.5	77	3	6	7.5	15
Red Oak	46	92	68.5	137	14	28	34	69
Sugar Maple	26.5	53	54	108	8	16	20	40
Unspecified	19	38	56	112	6	12	14	28

[a] References 18-19. Factors are an arithmetic average of results obtained by burning high and low moisture content conical piles, ignited either at the top or around the periphery of the bottom. The windrow arrangement was only tested on Modesto Ash, Catalpa, American Elm, Sweet Gum, Silver Maple, and Tulip Poplar, and results are included in the averages for these species.

[b] The majority of particulate is submicrometer in size.

[c] Tests indicate that total organic compound (TOC) emissions average 29% methane, 11% other saturates, 33% olefins, 27% other (aromatics, acetylene, oxygenates).

Table 2.5-7 (Metric And English Units). EMISSION FACTORS FOR ORGANIC COMPOUNDS FROM BURNING PLASTIC FILM[a]

EMISSION FACTOR RATING: C

Pollutant	Units	Condition Of Plastic			
		Unused Plastic		Used Plastic	
		Pile[b]	Forced Air[c]	Pile[b]	Forced Air[c]
Benzene	mg/kg plastic	0.0478	0.0288	0.0123	0.0244
	lb/1000 tons plastic	0.0955	0.0575	0.0247	0.0488
Toluene	mg/kg plastic	0.0046	0.0081	0.0033	0.0124
	lb/1000 tons plastic	0.0092	0.0161	0.0066	0.0248
Ethyl benzene	mg/kg plastic	0.0006	0.0029	0.0012	0.0056
	lb/1000 tons plastic	0.0011	0.0058	0.0025	0.0111
1-Hexene	mg/kg plastic	0.0010	0.0148	0.0043	0.0220
	lb/1000 tons plastic	0.0020	0.0296	0.0086	0.0440

[a] Reference 22.
[b] Emission factors are for plastic gathered in a pile and burned.
[c] Emission factors are for plastic burned in a pile with a forced air current.

Table 2.5-8 (Metric And English Units). POLYCYCLIC AROMATIC HYDROCARBON EMISSION FACTORS FROM OPEN BURNING OF AGRICULTURAL PLASTIC FILM[a]

EMISSION FACTOR RATING: C

Pollutant	Units	Condition Of Plastic			
		Unused Plastic		Used Plastic	
		Pile[b]	Forced Air[c]	Pile[b]	Forced Air[c,d]
Anthracene	µg/kg plastic film	7.14	0.66	1.32	0.40
	lb/1000 tons plastic film	0.0143	0.0013	0.0026	0.0008
Benzo(A)pyrene	µg/kg plastic film	41.76	1.45	7.53	0.00
	lb/1000 tons plastic film	0.0835	0.0029	0.0151	0.0000
Benzo(B)fluoranthene	µg/kg plastic film	34.63	1.59	9.25	0.93
	lb/1000 tons plastic film	0.0693	0.0032	0.0185	0.0019
Benzo(e)pyrene	µg/kg plastic film	32.38	1.45	9.65	0.00
	lb/1000 tons plastic film	0.0648	0.0029	0.0193	0.0000
Benzo(G,H,I)perylene	µg/kg plastic film	49.43	2.11	14.93	0.00
	lb/1000 tons plastic film	0.0989	0.0042	0.0299	0.0000
Benzo(K)fluoranthene	µg/kg plastic film	13.74	0.66	2.51	0.00
	lb/1000 tons plastic film	0.0275	0.0013	0.0050	0.0000
Benz(A)anthracene	µg/kg plastic film	52.73	2.91	14.41	1.19
	lb/1000 tons plastic film	0.1055	0.0058	0.0288	0.0024
Chrysene	µg/kg plastic film	54.98	3.70	17.18	1.19
	lb/1000 tons plastic film	0.1100	0.0074	0.0344	0.0024

Table 2.5-8 (cont.).

Pollutant	Units	Condition Of Plastic			
		Unused Plastic		Used Plastic	
		Pile[b]	Forced Air[c]	Pile[b]	Forced Air[c,d]
Fluoranthene	µg/kg plastic film	313.08	53.39	107.05	39.12
	lb/1000 tons plastic film	0.6262	0.1068	0.2141	0.0782
Indeno(1,2,3-CD)pyrene	µg/kg plastic film	40.04	2.78	10.70	0.00
	lb/1000 tons plastic film	0.0801	0.0056	0.0214	0.0000
Phenanthrene	µg/kg plastic film	60.40	12.56	24.05	8.72
	lb/1000 tons plastic film	0.1208	0.0251	0.0481	0.0174
Pyrene	µg/kg plastic film	203.26	18.24	58.81	5.95
	lb/1000 tons plastic film	0.4065	0.0365	0.1176	0.0119
Retene	µg/kg plastic film	32.38	2.91	18.77	3.04
	lb/1000 tons plastic film	0.0648	0.0058	0.0375	0.0061

[a] Reference 22.
[b] Emission factors are for plastic gathered in a pile and burned.
[c] Emission factors are for plastic burned in a pile with a forced air current.
[d] 0.00 and 0.0000 values indicate pollutant was not found at that factor level.

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