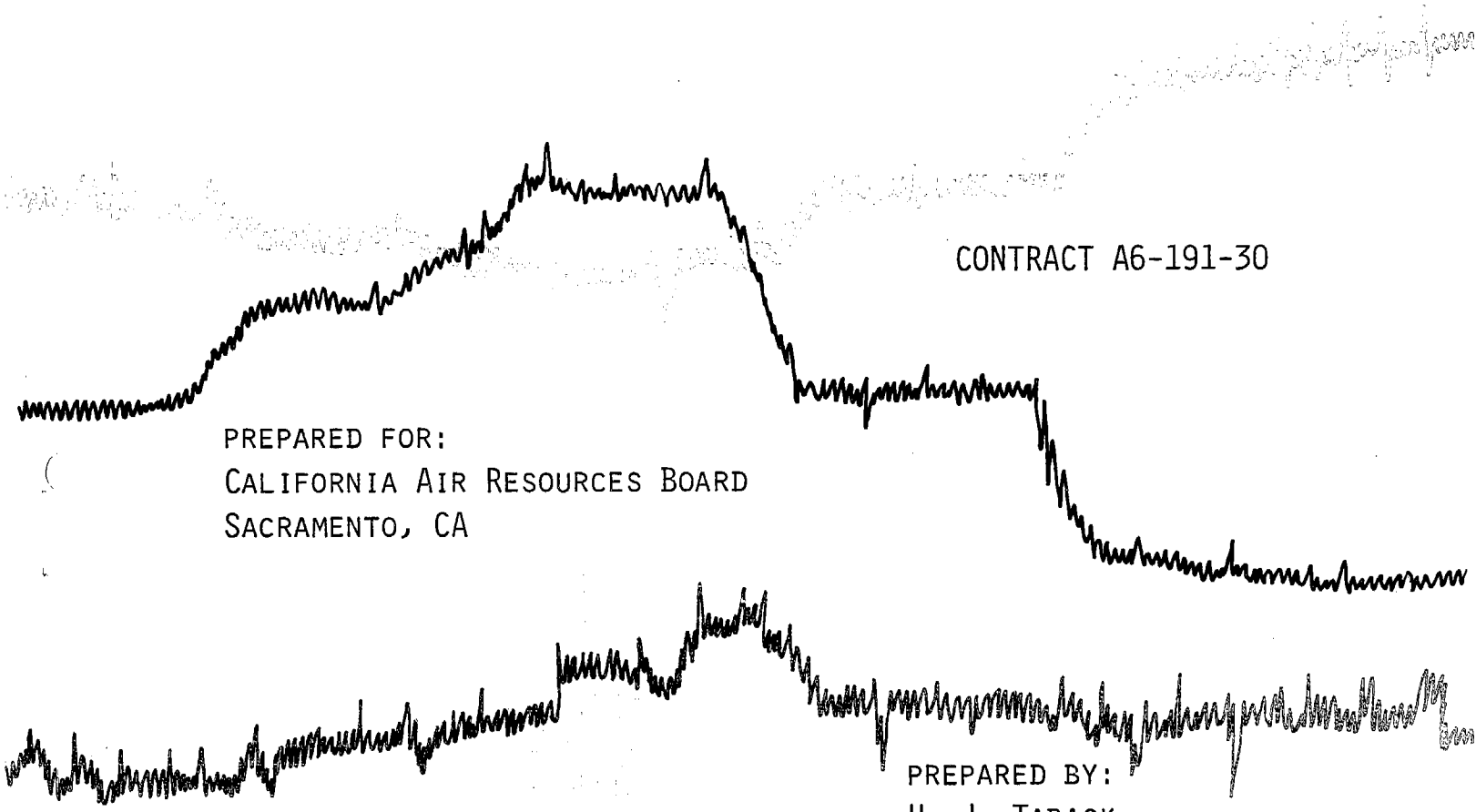
FINE PARTICLE EMISSIONS FROM STATIONARY AND MISCELLANEOUS SOURCES IN THE SOUTH COAST AIR BASIN

APPENDIX

KVB 5806-783*



CONTRACT A6-191-30

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I. High Degree of Confidence--

Based on a composite of many tests so that the data are highly representative of the population.

II. Above Average Confidence

Based on a moderate number of tests or questionnaires which indicate that the data are reasonably representative of the population.

III. Average Confidence

Based on data which seems reasonable and should be more or less representative of the population.

IV. Below Average Confidence

Based on a little data but not sufficient to be representative of the population.

V. Low Degree of Confidence

Results are highly judgemental and could vary significantly from source to source.

PARTICULATE PROFILE

Title: Industrial Boilers (#2 Fuel Oil)

Profile Key: 0002

Source of Data:

X KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

1-01-005-01, 02, 03

1-02-005-01, 02, 03

1-03-005-01, 02, 03

Test # 16

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		2.4	0.8	0.8	96	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	d †	d †	d †	t	t
Cadmium	12110	d	d	d	d	d
Chromium	12112	d	d	d	t	t
Lead	12128	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Selenium	12154	d	d	d	d	d
Tin	12160	d	d	d	d	d
Titanium	12161	d	d	d	d	d
Zinc	12167	t	t	t	t	t
Sulfates	12403	25	25	25	25	25
Nitrate (H_2O sol)	12306	t	t	t	4	4
Total Carbon	12116	15	15	15	15	15
(Volatile Carbon)	15101	(14)	(14)	(14)	(14)	(14)
Subtotal		40	40	40	44	44
Other	(O_2,Si,Mg,Al)	60	60	60	56	56
Total		100	100	100	100	100

*Ref. A-2

†Estimated to be same composition as <1μm fraction

( ) included in total carbon

10/78
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PARTICULATE PROFILE

Title: Internal Combustion Engines (Diesel Fuel)

Profile Key: 0003

Applicable SCC's
2-01-003-01
2-02-004-01
2-03-001-01
2-04-999-98

Source of Data:
X KVB Test
___ Literature Data--Ref.*
X Estimate--Basis†
Confidence Level IV

Test # 15

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		4	2	2	92	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	5 †	5 †	5 †	5	5
Iron	12126	t	t	t	t	t
Silicon	12165	t	t	t	t	t
Vanadium	12164	t	t	t	t	t
Sulfates	12403	15	15	15	15	15
Total Carbon	12116	4	4	4	4	4
(Volatile Carbon)	15101	(d)	(d)	(d)	(d)	(d)
(Carbonates)	12501	(t)	(t)	(t)	(t)	(t)
Subtotal		24	24	24	24	24
Other	(O_2,Si,Al,Mg)	76	76	76	76	76
Total		100	100	100	100	100

†Estimated to be same composition as <1μm fraction

10/78
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PARTICULATE PROFILE

Title: Internal Combustion Engines (Digester Gas Fuel)

Profile Key: 0004

Source of Data:

X KVB Test

__ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

2-01-002-02, 2 02-002-02

2-02-008-02, 2-03-999-97

2-04-999-97

Test # 7

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		.6	.2	.4	99	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%			d < 0.1%	
Bromine	12109	d †	d †	d †	d	d
Calcium	12111	t	t	t	t	t
Chlorine	12115	7	7	7	7	7
Chromium	12112	d	d	d	d	d
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	d	d	d	d	d
Manganese	12132	d	d	d	d	d
Nickel	12136	d	d	d	d	d
Potassium	12180	t	t	t	t	t
Zinc	12167	d	d	d	d	d
Sulfates	12403	45	45	45	45	45
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	20	20	20	20	20
(Volatile Carbon)	15101	(18)	(18)	(18)	(18)	(18)
Subtotal		90	90	90	90	90
Other	(O_2,Na)	10	10	10	10	10
Total		100	100	100	100	100

†Estimated to be same composition as <1μm fraction

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Wood Waste Boiler

Profile Key: 0005

Source of Data:

X KVB Test

X Literature Data--Ref.*

___ Estimate--Basis†

Confidence Level II

Applicable SCC's

1-01-009-01, 02, 03

1-02-009-01, 02, 03

1-03-009-01, 02, 03

Test # 5

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		.3	5	21	74	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	d	d		d	d
Barium	12107	d	d		d	d
Cadmium	12110				d	d
Calcium	12111	7	14	t	1	1
Chlorine	12115				2	2
Chromium	12112	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	4	5	4	t	1
Lead	12128			d	d	d
Manganese	12132	t	t	t	t	t
Molybdenum	12134	t	t	t	t	t
Nickel	12136	t	t	t	t	t
Potassium	12180	3	6	3	1	1
Rubidium	12176	d	d	d		d
Selenium	12154			d	d	d
Silicon	12165	10	10	10	10	10
Strontium	12168	d	d	d	d	d
Titanium	12161	t	t	d	d	d
Zinc	12167	d	d	d	t	t
Sulfates	12403	t	t	2	3	3
Total Carbon	12116	30	30	30	30	30
(Volatile Carbon)	15101	(16)	(7)	(23)	(7)	(10)
(Carbonates)	12501	(3)	(7)	(t)	(t)	(t)
Subtotal		54	65	49	47	48
Other	(O_2,Na,Mg,Al)	46	35	51	53	52
Total		100	100	100	100	100

*Ref A-1

( ) included in total carbon

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Utility Boilers (Residual Fuel)

Profile Key: 0006

Source of Data:

X KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level II

Applicable SCC's

1-01-004-01, 1-01-004-02

1-02-004-01

1-03-004-01

Test # 11,12,13,21,22,23,24,32,33

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		3	1	2	94	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	d	d	d †	d	d
Barium	12107	t			t	t
Bromine	12109				d	d
Cadmium	12110		d	d	d	
Calcium	12111	t	t	t	10	10
Chromium	12112	t	t	t	t	t
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	4	4	4	2	2
Lead	12128	d	d	d	d	d
Manganese	12132	d	d	d	d	d
Molybdenum	12134	d	d		d	d
Nickel	12136	2	2	2	5	5
Potassium	12180	t	t	t	t	t
Selenium	12154	d	d	d	d	d
Strontium	12168	d	d	d	d	d
Titanium	12161	d	d	d	d	d
Vanadium	12164	t	t	t	t	t
Zinc	12167	t	t	t	t	t
Sulfates	12403	20	20	20	30	28
Nitrate (H_2O sol)	12306	d	d	d	d	d
Total Carbon	12116	30	30	30	20	22
(Volatile Carbon)	15101	(20)	(20)	(20)	(14)	(15)
Subtotal		56	56	56	67	67
Other	(O_2,Mg,Al,Na)	44	44	44	33	33
Total		100	100	100	100	100

*Ref. A-2

†Estimated to be same as 3-10μm size fraction

( ) included in total carbon

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Rice Dryer

Profile Key: 0007

Source of Data:

X KVB Test

____ Literature Data--Ref.*

____ Estimate--Basis†

Applicable SCC's

3-02-005-04

3-02-006-04

Confidence Level III

Test #4

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		46	12	12	30	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	d				d
Barium	12107	d				d
Bromine	12109	d	d	d	d	d
Calcium	12111	t	1	1	1	t
Chlorine	12115	t			t	t
Chromium	12112	t	t	t	t	t
Copper	12114	d	d	d	d	d
Iron	12126	t	4	4	5	t
Manganese	12132	t	t	t	t	t
Molybdenum	12134	d				d
Nickel	12136	d	t	t	t	t
Potassium	12180	t	3	t	t	t
Rubidium	12176	t				
Silicon	12165	11	8	6	5	10
Strontium	12168	d				d
Titanium	12161	d				d
Vanadium	12164		t			
Vitrium	12183				t	
Zinc	12167	d				d
Sulfates	12403	d				d
Nitrate (H_2O sol)	12306	d				d
Total Carbon	12116	12				12
(Volatile Carbon)	15101	(12)				(12)
Carbonates	12501	d				
Subtotal		23	16	11	11	22
Other	(O_2, N_2, H_2)	77	84	89	89	88
Total		100	100	100	100	100

( ) included in total carbon

10/78
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PARTICULATE PROFILE

Title: Coffee/Carob Roasting (Direct Fire)

Profile Key: 0008

Source of Data:

X KVB Test

___ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-02-002-01

Test # 37

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		38	1	1	60	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%			d < 0.1%	
Bromine	12109	d	d †	d †	d	d
Cadmium	12110				d	d
Calcium	12111	t	d	d	d	d
Chromium	12112	d				d
Cobalt	12113				d	d
Copper	12114	d	d	d	d	d
Iron	12126	t	d	d	d	t
Manganese	12132	d				
Nickel	12136	d	d	d	d	d
Potassium	12180	t				t
Selenium	12154				d	d
Strontium	12168	d	d	d	d	d
Tin	12160				d	
Zinc	12167	d	d	d	d	d
Sulfates	12403	d	d	t	t	t
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	34	24	24	24	28
(Volatile Carbon)	15101	(23)	(23)	(23)	(23)	(27)
Subtotal		34	24	24	24	28
Other	(O_2,N_2,H_2,Si)	66	76	76	76	72
Total		100	100	100	100	100

†Estimated to be same composition as <1μm fraction

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Steel Heat Treating (Salt Quench)

Profile Key: 0009

Source of Data:

X KVB Test

___ Literature Data--Ref.*

___ Estimate--Basis†

Confidence Level III

Applicable SCC's

3-04-007-04

3-04-009-01

Test # 14

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		4	8	14	74	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Barium	12107	2	t	t	t	t
Bromine	12109	d	d	d	d	d
Cadmium	12110	d	d	d	d	d
Calcium	12111				t	t
Chlorine	12115	30	30	30	30	30
Chromium	12112	d	d	d	t	t
Copper	12114	d	d	d	d	d
Iron	12126	t	t	t	9	9
Lead	12128	d		d	d	d
Molybdenum	12134				t	t
Nickel	12136	d	d	d	2	2
Potassium	12180	10	14	13	t	4
Zinc	12167	d	d	d	d	d
Sulfates	12403	t	t	t	32	32
Nitrate (H_2O sol)	12306	d	d	t	t	t
Total Carbon	12116	5	5	3	8	7
(Volatile Carbon)	15101	(5)	(5)	(2)	(7)	(6)
Subtotal		47	49	48	82	84
Other	(Na, Si, O_2)	53	51	52	18	16
Total		100	100	100	100	100

( ) included in total carbon

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Steel Abrasive Blasting (Sandblasting)

Profile Key: 0010

Source of Data:

X KVB Test

___ Literature Data--Ref.*

___ Estimate--Basis†

Confidence Level IV

Applicable SCC's

3-09-999-99

Test # 34

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		14	6	6	74	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Cadmium	12110	d	d		d	d
Calcium	12111	d	t		t	t
Chromium	12112	d	t	t	t	t
Copper	12114		d	d	d	d
Iron	12126	5	18	15	15	15
Lead	12128		d	d	d	d
Manganese	12132	d	t	t	t	t
Molybdenum	12134		t	t	t	t
Nickel	12136	d	t	t	t	t
Rubidium	12176		d			
Selenium	12154		d			
Strontium	12168	d	d	d	d	d
Titanium	12161	t	2	3	3	3
Zirconium	12185	t	t	t	t	t
Sulfates	12403	d	d	d	d	d
Nitrates (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	t	d	d	d	d
(Carbonates)	12501	(t)				
Subtotal		6	22	20	20	20
Other	(Al_2O_3)	94	78	80	80	80
Total		100	100	100	100	100

( ) included in total carbon

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Aluminum Foundry (Smelt-Reverb FNC)

Profile Key: 0011

Source of Data:

X KVB Test

__ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-04-001-01

3-04-001-03

3-90-006-05

Test # 10

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		5	4	5	86	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	3 †	3 †	3 †	3	3
Chlorine	12115	11	11	11	11	11
Chromium	12112	d	d	d	d	d
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	6	6	6	6	6
Lead	12128	d	d	d	d	d
Manganese	12132	t	t	t	t	t
Molybdenum	12134	d	d	d	d	d
Nickel	12136	t	t	t	t	t
Potassium	12180	t	t	t	t	t
Tin	12160	d	d	d	d	d
Titanium	12161	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Sulfates	12403	16	16	16	16	16
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	13	13	13	13	13
(Volatile Carbon)	15101	(13)	(13)	(13)	(13)	(13)
Subtotal		49	49	49	49	49
Other	(Al_2O_3)	51	51	51	51	51
Total		100	100	100	100	100

†Estimated to be same composition as <1μm fraction

( ) included in total carbon

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Steel-Sinter Plant

Profile Key: 0012

Source of Data:

X KVB Test

___ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-03-008-03

Test # 26

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		2	1	1	95	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	d	t	t†	t	t
Bromine	12109	d	t	t	t	t
Cadmium	12110	d	t	t	t	t
Calcium	12111	9	1	t	t	t
Cesium	12118	t	t	t	t	t
Chlorine	12115	5	14	25	17	28
Chromium	12112	t	t	t	3	3
Copper	12114	t	2	2	2	2
Iodine	12141		d	d	d	d
Iron	12126	20	20	20	13	14
Lead	12128	t	13	12	11	10
Manganese	12132	t	t	t	t	t
Molybdenum	12134	d			d	d
Potassium	12180	3	9	16	20	19
Rubidium	12176	d	t	t	t	t
Selenium	12154	d	d	d	d	d
Silver	12166	d	d	d	d	d
Strontium	12168	d			d	d
Zinc	12167	d	t	t	t	t
Zirconium	12185	d			d	d
Sulfates	12403	8	8	8	20	19
Total Carbon	12116	15	7	t	11	10
Subtotal		60	74	83	97	95
Other	(O_2,Si,Al, N_2,H_2,Mg,F)	40	26	17	3	5
Total		100	100	100	100	100

†Estimated composition for this size range based on test data from other size ranges

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KVB 5806-783

PARTICULATE PROFILE

Title: Steel Open Hearth Furnace (Ox Lance)

Profile Key: 0013

Source of Data:

X KVB Test

___ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-03-009-01

3-04-007-03

Test # 36

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		2	4	7	88	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%			d < 0.1%	
Antimony	12102	d	d †	d	d	d
Arsenic	12103	d	d	d	d	d
Bromine	12109	d			d	d
Cadmium	12110	d	d	d	d	d
Calcium	12111	2	t	t	t	t
Chromium	12112	t	t	t	2	2
Copper	12114	t	t	t	t	t
Iron	12126	18	16	15	10	11
Lead	12128	t	t	t	t	t
Manganese	12132	t	t	t	t	t
Molybdenum	12134	d	d	d	d	d
Nickel	12136	t	t	t	t	t
Potassium	12180	3	3	4	5	5
Rubidium	12176	d	d	d	d	d
Silver	12166	d	d	d	d	d
Tin	12160	d	d	d	d	d
Vanadium	12164	t	t	t	t	t
Sulfates	12403	33	35	38	40	40
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	20	20	20	20	20
(Volatile Carbon)	15101	(20)	(20)	(20)	(20)	(20)
Subtotal		76	74	77	77	78
Other	($Si, O_2, Al, Mg, N_2, H_2, F$)	24	26	23	23	22
Total		100	100	100	100	100

†Estimated composition for this size range based on data from other size ranges

( ) included in total carbon

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Calcination of Gypsum (Calciner)

Profile Key: 0014

Source of Data:

X KVB Test

___ Literature Data--Ref.*

___ Estimate--Basis†

Confidence Level III

Applicable SCC's

3-05-015-02

3-05-015-03

3-05-015-04, 99

Test # 6

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		12	32	34	22	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	d	d			d
Barium	12107		d			d
Bromine	12109				d	d
Cadmium	12110			d	d	d
Calcium	12111	10	9	15	13	12
Chlorine	12115				t	t
Chromium	12112	d	d	d	t	t
Copper	12114	d	d	d	d	d
Iron	12126	t	t	t	t	t
Lead	12128			d	d	d
Manganese	12132	d	d	d	d	d
Molybdenum	12134	d	d	d	d	d
Nickel	12136	d	d	d	t	t
Potassium	12180		d	t	t	t
Selenium	12154		d		d	d
Strontium	12168	d	d	d	d	d
Yttrium	12183				d	d
Zinc	12167	d	d	d	d	d
Sulfates	12403	62	57	61	41	55
Nitrate (H_2O sol)	12306	d	d	d	d	d
Total Carbon	12116	2	t	5	1	2
(Volatile Carbon)	15101			(4)		(2)
(Carbonates)	12501	(t)	(t)	(t)		(t)
Subtotal		74	66	81	55	69
Other	(O_2, Na, Al, Mg)	26	34	19	45	31
Total		100	100	100	100	100

( ) included in total carbon

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Brick Grinding and Screening

Profile Key: 0015

Source of Data:

X KVB Test

___ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-05-003-02

3-05-008-01

3-05-008-02, 03

Test # 8

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		44	4	4	48	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	d	d †	d †	d †	d
Barium	12107	d	d	d	d	d
Calcium	12111	t	t	t	t	t
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Gallium	12124	d	d	d	d	d
Iron	12126	2	2	2	2	2
Manganese	12132	d	d	d	d	d
Molybdenum	12134	d	d	d	d	d
Nickel	12136	d	d	d	d	d
Niobium	12147	d	d	d	d	d
Potassium	12180	1	1	1	1	1
Rubidium	12176	d	d	d	d	d
Silicon	12165	27	27	27	27	27
Titanium	12161	t	t	t	t	t
Zinc	12167	d	d	d	d	d
Zirconium	12185	d	d	d	d	d
Sulfates	12403	t	t	t	t	t
Nitrate (H_2O sol)	12306	d	d	d	d	d
Carbonates	12501	t	t	t	t	t
Subtotal		30	30	30	30	30
Other	(O_2, Al, Mg)	70	70	70	70	70
Total		100	100	100	100	100

†Estimated composition based on > 10 μm size range

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Cement Production (Kilns - Coal Fired)

Profile Key: 0016

Source of Data:

X KVB Test

X Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level II

Applicable SCC's

3-05-006-05

3-90-002-01

Test # 9,18

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		8	24	34	34	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Barium	12107	d	d		d	d
Cadmium	12110		d	d		
Calcium	12111	27	20	22	20	20
Chromium	12112	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	t	t	t	t	t
Lead	12128	d	d	d	d	d
Manganese	12132	d	d	d	d	d
Molybdenum	12134	d	d	d	d	d
Nickel	12136	d	d	d	d	d
Potassium	12180	1	2	2	2	2
Rubidium	12176	d	d	d		d
Selenium	12154	d	d	d	d	d
Silicon	12165	10	10	10	10	10
Silver	12166	d	d	d	d	d
Titanium	12161	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Sulfates	12403	4	3	2	60	25
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	16	19	19	8	12
(Volatile Carbon)		(4)	(5)	(4)	(4)	(4)
(Carbonates)	12501	(7)	(8)	(7)	(4)	(6)
Subtotal		58	54	54	100	68
Other	(O_2, Al, Mg)	42	46	46	0	32
Total		100	100	100	100	100

* Ref. A-9, A-12

( ) included in total carbon

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Glass Melting Furnace

Profile Key: 0017

Source of Data:

X KVB Test

____ Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level II

Applicable SCC's

3-05-014-01

3-05-014-11

3-90-006-08

Test # 20,28,35

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		2	1	2	95	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	2	2	2	2	2
Chromium	12112	t	t	t	t	t
Iron	12126	t	t	t	t	t
Lead	12128	t	t	t	t	t
Nickel	12136				d	d
Potassium	12180	3	3	3	3	3
Selenium	12154			d	4	4
Zinc	12167			d	d	d
Sulfates	12403	65	65	65	55	58
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116				12	12
Subtotal		70	70	70	76	79
Other	(Si, O_2, Mg, Al, Na, F)	30	30	30	24	21
Total		100	100	100	100	100

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Fiberglass Forming Line

Profile Key: 0018

Source of Data:

X KVB Test

___ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-05-012-04

Test # 38

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		0.6	0.2	0.2	99	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Bromine	12109	d	d	d	d	d
Calcium	12111	d	d	d	d	d
Chlorine	12115	3	3	3	15	15
Chromium	12112	d	d	d	d	d
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	t	t	t	t	t
Lead	12128	d	d	d	d	d
Nickel	12136	d	d	d	d	d
Potassium	12180	t	t	t	t	t
Selenium	12154	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Sulfates	12403	t	t	t	t	t
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	15	15	15	30	30
(Volatile Carbon)	15101	(28)	(28)	(28)	(28)	(28)
Subtotal		18	18	18	45	45
Other	(Si, O_2, Mg, Al, Na, F)	82	82	82	55	55
Total		100	100	100	100	100

†Estimated composition based on <1μm size range

( ) included in total carbon

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Asphalt Roofing Manufacture

Profile Key: 0019

Source of Data:

X KVB Test

___ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level IV

Applicable SCC's

3-05-001-02, 3-05-001-03

3-05-001-04, 3-05-001-99

Test #25

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		2	3	4	91	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Barium	12107	d †	d †	d †	d	d
Bromine	12109	d	d	d	d	d
Cadmium	12110	d	d	d	d	
Calcium	1211	3	3	3	3	3
Cesium	12118	12	12	12	12	12
Chlorine	12115	d	d	d	d	d
Cobalt	12113	2	2	2	2	2
Copper	12114	d	d	d	d	d
Iron	12126	2	2	2	2	2
Lead	12128	d	d	d	d	d
Manganese	12132	t	t	t	t	t
Molybdenum	12134	d	d	d	d	d
Nickel	12136	t	t	t	t	t
Potassium	12180	t	t	t	t	t
Selenium	12154	t	t	t	t	t
Silver	12166	d	d	d	d	d
Zinc	12167	t	t	t	t	t
Sulfates	12403	10	15	20	23	22
Total Carbon	12116	24	24	24	24	24
(Volatile Carbon)	15101	(23)	(23)	(23)	(23)	(23)
Subtotal		53	58	63	66	65
Other	(Si, O_2, Al, Mg)	47	42	37	34	35
Total		100	100	100	100	100

†Estimated composition based <1μm size range

( ) included in total carbon

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Asphaltic Concrete Batch Plant

Profile Key: 0020

Source of Data:

X KVB Test

___ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-05-002-01

3-90-006-01

Test #29

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		60	6	4	30	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	t	†	†		t
Barium	12107	t				t
Calcium	12111	2	4	6	10	5
Chromium	12112	t	t	t	t	t
Iron	12126	4	t	t	t	3
Potassium	12180	2				1
						d
Silver	12166	d				d
Titanium	12161	t	t	t	t	t
Sulfates	12403	2	t	t	t	2
Nitrate (H_2O sol)	12306	t				t
Total Carbon	12116	t	t	t	14	5
Subtotal		10	4	6	24	16
Other	(Si,O_2,Mg,Al)	90	96	94	76	84
Total		100	100	100	100	100

†Estimated composition based on data for size ranges with test data available.

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KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Paint Spray Booth (Water Solvent)

Profile Key: 0021

Source of Data:

X KVB Test

__ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

4-02-001-01

Test # 27

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		32	5	5	58	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Bromine	12109	d	d †	d †	d †	d
Cadmium	12110	d	d	d	d	d
Calcium	12111	t	t	t	t	t
Chromium	12112	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Titanium	12161	3	3	3	3	3
Zinc	12167	d	d	d	d	d
Sulfates	12403	2	2	2	2	2
Nitrate (H_2O sol)	12306	d	d	d	d	d
Total Carbon	12116	50†	50	50	50	50
(Volatile Carbon)	15101	(40)†	(40)	(40)	(40)	(40)
Subtotal		55	55	55	55	55
Other	(O_2,N_2,H,P, Li, Be)	45	45	45	45	45
Total		100	100	100	100	100

†Estimated composition based on >10μm size range and compositional data.

( ) included in total carbon

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Paint Spray Booth (Oil Solvent) **Profile Key:** 0022

Source of Data:

X KVB Test

__ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level IV

Applicable SCC's

4-02-003-01

4-02-004-01

4-02-004-05

Test #31

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		4	3	3	90	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	t †	t †	t †	t †	t
Iron	12126	t	t	t	t	t
Titanium	12161	3	3	3	3	3
Sulfates	12403	2	2	2	2	2
Total Carbon	12116	55	55	55	55	55
(Volatile Carbon)	15101	(55)	(55)	(55)	(55)	(55)
Subtotal		60	60	60	60	60
Other	(O_2, N_2, H_2)	40	40	40	40	40
Total		100	100	100	100	100

†Estimated composition based on Profile Key 0021

( ) included in total carbon

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Boric Acid Manufacture

Profile Key: 0023

Source of Data:

X KVB Test

____ Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level III

Applicable SCC's

3-01-999-99

Test # 17

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		10	1	1	88	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Cadmium	12110	d	d	d	d	d
Calcium	12111	d	d	d	d	d
Chlorine	12115	d	d	t	t	t
Chromium	12112	d	d			d
Copper	12114	d	d	d	d	d
Iron	12126	1	t	t	t	t
Lead	12128	d	d			d
Manganese	12132	d	d			d
Nickel	12136	d	d	d	d	d
Silver	12166	d			d	d
Zinc	12167	d	d	d	d	d
Sulfates	12403	2	2	2	2	2
Nitrate (H_2O sol)	12306	t	t	t	t	t
Subtotal		3	2	2	2	2
Other (Boric Acid - H_3BO_3)		97	98	98	98	98
Total		100	100	100	100	100

PARTICULATE PROFILE

Title: Wood Operation (Resawing)

Profile Key: 0025

Source of Data:

X KVB Test

____ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-07-008-99

Test # 39

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		60	11	9	20	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Barium	12107	d	d †	d†	d †	d
Bismuth	12106	d	d	d	d	d
Bromine	12109	t	t	t	t	t
Chromium	12112	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	t	t	t	t	t
Lead	12128	d	d	d	d	d
Manganese	12132	d	d	d	d	d
Molybdenum	12134	d	d	d	d	d
Nickel	12136	d	d	d	d	d
Tin	12160	d	d	d	d	d
Titanium	12161	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Sulfates	12403	t	t	t	t	t
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	42	42	42	42	42
(Volatile Carbon)	15101	(39)	(39)	(39)	(39)	(39)
Subtotal		42	42	42	42	42
Other	(O_2, N_2, H_2)	58	58	58	58	58
Total		100	100	100	100	100

†Estimated composition based on computation of >10μm size range

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KVB 5806-783

PARTICULATE PROFILE

Title: Wood Operation (Sanding)

Profile Key: 0026

Source of Data:

X KVB Test

____ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-07-007-02

Test # 30

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		8	3	3	86	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	d	d †	d †	d †	d
Iron	12126	d	d	d	d	d
Strontium	12168	d	d	d	d	d
Total Carbon	12116	41	41	41	41	41
(Volatile Carbon)	15101	(35)	(35)	(35)	(35)	(35)
(Carbonates)	12501	(t)				
Subtotal		41	41	41	41	41
Other	(O_2, N_2, H_2)	59	59	59	59	59
Total		100	100	100	100	100

†Estimated composition based on composition of >10μm size range.

( ) included in total carbon

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Petroleum Heaters (Natural Gas Fuel)

Profile Key: 0027

Source of Data:

X KVB Test

____ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-06-001-02

3-06-001-04

Test # 40

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		5	2	2	91	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Bromine	12109	d	d	d	d	d
Cadmium	12110	d	d	d	d	d
Calcium	12111	5	5	5	5	5
Chromium	12112	t	t	t	t	t
Cobalt	12113	2	2	2	2	2
Copper	12114	d	d	d	d	d
Iron	12126	t	t	t	t	t
Lead	12128	d	d	d	d	d
Manganese	12132	d	d	d	d	d
Molybdenum	12134	d	d	d	d	d
Nickel	12136	t	t	t	t	t
Selenium	12154	t	t	t	t	t
Strontium	12168	d	d	d	d	d
Zinc	12167	t	t	t	t	t
Zirconium	12185	d	d	d	d	d
Sulfates	12403	47	47	47	47	47
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon (Volatile Carbon)	12116	7	7	7	7	7
	15101	(7)	(7)	(7)	(7)	(7)
Subtotal		61	61	61	61	61
Other	(O_2, Na, Cl)	39	39	39	39	39
Total		100	100	100	100	100

†Estimated composition based on composition of <1μm size range

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Petroleum - FCC Units/CO Boiler

Profile Key: 0028

Source of Data:

X KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-06-002-01

Test # 41

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		39	4	6	51	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Arsenic	12103	d	d †	d	d	d
Lanthanum	12146	t	t	t	t	t
Praseodymium	12155	t	t	t	t	t
Neodymium	12144	t	t	t	t	t
Calcium	12111	t	t	t	t	t
Cesium	12118	1	1	1	2	1
Gallium	12124	d	d	d	d	d
Iron	12126	t	t	1	1	t
Lead	12128	d	d	d	d	d
Molybdenum	12134	d	d	d	d	d
Nickel	12136	d	d	d	d	d
Silicon	12165	20	20	20	d	10
Strontium	12168	d	d	d	d	d
Titanium	12161	t	t	t	t	t
Sulfates	12403	7	7	6	50	30
Total Carbon (Volatile Carbon)	12116 15101				4 (3)	2 (1.5)
Subtotal		28	28	28	57	43
Other	(O_2, Mg, Al)	72	72	72	43	57
Total		100	100	100	100	100

†Estimated composition based on composition of other size ranges with data

*Ref. A-4

10/78
KVB 5806-783

PARTICULATE PROFILE

Title: Feed and Grain Operations

Profile Key: 0029

Source of Data:

____ KVB Test

_X_ Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level IV

Applicable SCC's

3,02-005-01, 02, 03

3-02-006-01, 02, 03

3-02-007-30

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		71	27	2	0	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	t	t	t	t	t
Copper	12114	d	d	d	d	d
Iron	12126	d	d	d	d	d
Potassium	12180	t	t	t	t	t
Silicon	12165	15	15	15	15	15
Sulfates	12403	t	t	t	t	t
Total Carbon	12116	30	30	30	30	30
Subtotal		45	45	45	45	45
Other	(O_2,N_2,H_2,P)	55	55	55	55	55
Total		100	100	100	100	100

*Ref. A-5

10/78
KVB 5806-783
REVISED 6-15-79

PARTICULATE PROFILE

Title: Limestone Kilns

Profile Key: 0030

Source of Data:

X KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level III

Applicable SCC's

3-05-016-03

3-05-016-99

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range †		70	17	6	7	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	1211	30†	30†	30†	30†	30
Iron	12126	2	2	2	2	2
Selenium	12165	10	10	10	10	10
Carbonates	12501	40	40	40	40	40
Subtotal		82	82	82	82	82
Other	(O_2, Si, Mg)	18	18	18	18	18
Total		100	100	100	100	100

* Ref. A-6

†Estimated composition based on engineering judgment

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REVISED 6-15-79

PARTICULATE PROFILE

Title: Basic Oxygen Furnace (Steel)

Profile Key: 0031

Source of Data:

____ KVB Test

_X_ Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level V

Applicable SCC's

3-03-009-03

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		0	0	5	95	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Antimony	12102			d †	d †	d
Arsenic	12103			d	d	d
Bromine	12109			d	d	d
Cadmium	12110			d	d	d
Calcium	12111			t	t	t
Chromium	12112			2	2	2
Copper	12114			t	t	t
Iron	12126			11	11	11
Lead	12128			t	t	t
Manganese	12132			t	t	t
Molybdenum	12134			d	d	d
Nickel	12136			t	t	t
Potassium	12180			5	5	5
Rubidium	12176			d	d	d
Silver	12166			d	d	d
Tin	12160			d	d	d
Vanadium	12164			t	t	t
Sulfates	12403			40	40	40
Nitrate (H_2O sol)	12306			t	t	t
Total Carbon	12116			20	20	20
(Volatile Carbon)	15101			(20)	(20)	(20)
Subtotal				78	78	78
Other	(Si, O_2)			22	22	22
Total				100	100	100

*Ref. A-3

† Composition based on open hearth process, see profile #0013

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REVISED 6-15-79

PARTICULATE PROFILE

Title: Electric Arc Furnace (Steel) (No Lance)

Profile Key: 0032

Source of Data:

____ KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level V

Applicable SCC's

3-03-009-05

3-04-007-01

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		17	20	18	45	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
		†	†	†	†	†
Antimony	12102	d	d	d	d	d
Arsenic	12103	d	d	d	d	d
Bromine	12109	d	d	d	d	d
Cadmium	12110	d	d	d	d	d
Calcium	12111	t	t	t	t	t
Chromium	12112	2	2	2	2	2
Copper	12114	t	t	t	t	t
Iron	12126	11	11	11	11	11
Lead	12128	t	t	t	t	t
Manganese	12132	t	t	t	t	t
Molybdenum	12134	d	d	d	d	d
Nickel	12136	t	t	t	t	t
Potassium	12180	5	5	5	5	5
Rubidium	12176	d	d	d	d	d
Silver	12166	d	d	d	d	d
Tin	12160	d	d	d	d	d
Vanadium	12164	t	t	t	t	t
Sulfates	12403	40	40	40	40	40
Nitrate (H_2O sol)	12306	t	t	t	t	t
Total Carbon	12116	20	20	20	20	20
(Volatile Carbon)	15101	(20)	(20)	(20)	(20)	(20)
Subtotal		78	78	78	78	78
Other	(Si, O_2)	22	22	22	22	22
Total		100	100	100	100	100

*Ref. A-7

†Composition based on open hearth process--see Profile 0013

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PARTICULATE PROFILE

Title: Rock Crushers

Profile Key: 0033

Source of Data:

____ KVB Test

_X_ Literature Data--Ref.*

_X_ Estimate--Basis†

Confidence Level IV

Applicable SCC's

3-05-020-01, 3-05-020-02

3-05-020-05, 3-05-025-01

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range †		90	7	2	1	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Copper	12114	d†	d †	d †	d †	d
Iron	12126	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Silicon	12165	40	40	40	40	40
Sulfates	12403	t	t	t	t	t
Subtotal		40	40	40	40	40
Other	(O_2, P)	60	60	60	60	60
Total		100	100	100	100	100

*Ref. A-8

†Estimated composition based on engineering judgment

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PARTICULATE PROFILE

Title: Rock Screening **Profile Key:** 0034

Source of Data:

____ KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level IV

Applicable SCC's

3-05-020-06

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range †		50	30	18	2	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Copper	12114	d †	d †	d †	d †	d
Iron	12126	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Silicon	12165	40	40	40	40	40
Sulfates	12403	t	t	t	t	t
Subtotal		40	40	40	40	40
Other	(O_2, P)	60	60	60	60	60
Total		100	100	100	100	100

*Ref. A-8

†Estimated composition based on engineering judgment

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KVB 5806-783

PARTICULATE PROFILE

Title: Structural Fires

Profile Key: 0035

Source of Data:

____ KVB Test

____ Literature Data--Ref.*

__X__ Estimate--Basis†

Confidence Level ___V___

Applicable SCC's

9-24-089-95

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		2	5	13	80	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	7	14	t	1	1
Chlorine	12115				2	2
Iron	12126	5	5	5	2	2
Potassium	12180	5	5	5	5	5
Silicon	12165	10	10	10	10	10
Sulfates	12403	t	t			
Carbon	12116	30	30	30	30	30
(Volatile Carbon)	15101	(15)	(10)	(10)	(10)	(10)
(Carbonates)	12501	(3)	(7)	(t)	(t)	(5)
Subtotal		57	74	50	50	50
Other	(O_2, N_2, H_2)	43	26	50	50	50
Total		100	100	100	100	100

† Based on composition data from wood waste boiler and size distribution from the literature (see Section 2.3.3 of Vol. I).

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PARTICULATE PROFILE

Title: Residential Natural Gas Combustion

Profile Key: 0036

Source of Data:

____ KVB Test

___ Literature Data--Ref.*

_X_ Estimate--Basis†

Confidence Level IV

Applicable SCC's

1-05-001-06

1-05-002-06

9-14-001-07

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range †		0	0	0	100	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%			d < 0.1%	
					†	
Sulfate	12403				20	20
Total Carbon	12116				50	50
Subtotal					70	70
Other	(O_2, Na, Cl)				30	30
Total					100	100

† Based on Industrial Boiler Profile--see Profile #0049

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REVISED 6-15-79

PARTICULATE PROFILE

Title: Fireplaces - Wood Burning

Profile Key: 0037

Source of Data:

____ KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level IV

Applicable SCC's

9-14-034-00

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		38	14	12	36	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	7	14	t	1	5
Chlorine	12115				2	t
Iron	12126	5	5	5	2	4
Potassium	12180	5	5	5	5	5
Silicon	12165	10	10	10	10	10
Sulfates	12403	t	t			t
Total Carbon	12116	30	30	30	30	30
(Volatile Carbon)	15101	(15)	(10)	(10)	(10)	(10)
(Carbonate)	12501	(3)	(7)	(t)	(t)	(5)
Subtotal		57	74	50	50	54
Other	(O_2, N_2, H_2)	43	26	50	50	46
Total		100	100	100	100	100

* Ref. A-13

† Chemical composition based on wood boiler data.

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PARTICULATE PROFILE

Title: Tire Attrition Dust

Profile Key: 0038

Source of Data:

____ KVB Test

X Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level III

Applicable SCC's

9-49-999-01

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		60	5	15	20	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Zinc	12167	2	2	2	2	2
Total Carbon	12116	87	87	87	87	87
Subtotal		89	89	89	89	89
Other	(H_2, N_2)	11	11	11	11	11
Total		100	100	100	100	100

*Ref. A-9

PARTICULATE PROFILE

Title: Cigarette Smoke- Side Stream **Profile Key:** 0039

Source of Data:

____ KVB Test

X Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level II

Applicable SCC's

9-27-619-50

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		0	0	0	100	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Cadmium	12110				d	d
Total Carbon	12116				85	85
Subtotal					85	85
Other	(H_2, N_2)				15	15
Total					100	100

*Ref. A-10

PARTICULATE PROFILE

Title: Sea Salt Spray **Profile Key:** 0040

Source of Data:

____ KVB Test

X Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level III

Applicable SCC's

9-47-549-01

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		24	54	20	2	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Bromine	12109	t	t	t	t	t
Calcium	12111	1	1	1	1	1
Chlorine	12115	55	55	55	55	55
Iodine	12141	t	t	t	t	t
Magnesium	12139	4	4	4	4	4
Sodium	12184	31	31	31	31	31
Potassium	12180	1	1	1	1	1
Sulfur	12169	3	3	3	3	3
Subtotal		95	95	95	95	95
Other	(Al, O_2, N_2, F)	5	5	5	5	5
Total		100	100	100	100	100

*Ref. A-9

PARTICULATE PROFILE

Title: Brake Lining Attrition

Profile Key: 0041

Source of Data:

____ KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level IV

Applicable SCC's

9-41-009-52

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		0	0	0	100	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Asbestos ($CaSiO_3/MgSiO_3$)	12550				80	80
Total Carbon	12116				16	16
Subtotal					96	96
Other	(H_2, O_2, N_2)				4	4
Total					100	100

*Ref. A-11

†Estimated composition and size based on engineering estimate

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PARTICULATE PROFILE

Title: Livestock Dust **Profile Key:** 0042

Source of Data:

____ KVB Test

_X_ Literature Data--Ref.*

_X_ Estimate--Basis†

Confidence Level III

Applicable SCC's

9-49-999-98

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		25	13	16	46	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Aluminum	12101	8	8	8	8	8
Calcium	12111	2	2	2	2	2
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	3	3	3	3	3
Lead	12128	d	d	d	d	d
Manganese	12132	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Potassium	12180	2	2	2	2	2
Silicon	12165	20	20	20	20	20
Titanium	12161	t	t	t	t	t
Vanadium	12164	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Total Carbon	12116	2	2	2	2	2
Subtotal		37	37	37	37	37
Other	(O_2)	63	63	63	63	63
Total		100	100	100	100	100

*Ref. A-9

†Estimated size distribution based on engineering estimate

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PARTICULATE PROFILE

Title: Unpaved Road Dust

Profile Key: 0043

Source of Data:

____ KVB Test

X Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level III

Applicable SCC's

9-12-071-00

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		54	16	12	18	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Aluminum	12101	8	8	8	8	8
Barium	12107	d	d	d	d	d
Calcium	12111	2	2	2	2	2
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	3	3	3	3	3
Lead	12128	d	d	d	d	d
Manganese	12132	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Potassium	12180	2	2	2	2	2
Silicon	12165	20	20	20	20	20
Titanium	12161	t	t	t	t	t
Vanadium	12164	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Subtotal		35	35	35	35	35
Other	(O_2)	65	65	65	65	65
Total		100	100	100	100	100

*Ref. A-9

PARTICULATE PROFILE

Title: Road Building and Construction Dust

Profile Key: 0044

Source of Data:

____ KVB Test

X Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level III

Applicable SCC's

9-47-307-42

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		36	24	16	24	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Aluminum	12101	8	8	8	8	8
Calcium	12111	2	2	2	2	2
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	3	3	3	3	3
Lead	12128	d	d	d	d	d
Manganese	12132	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Potassium	12180	2	2	2	2	2
Silicon	12165	20	20	20	20	20
Titanium	12161	t	t	t	t	t
Vanadium	12164	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Subtotal		35	35	35	35	35
Other	(O_2, P)	65	65	65	65	65
Total		100	100	100	100	100

*Ref. A-9

PARTICULATE PROFILE

Title: Agricultural Burning

Profile Key: 0045

Source of Data:

____ KVB Test

X Literature Data--Ref.*

X Estimate--Basis†

Confidence Level IV

Applicable SCC's

5-03-002-01

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		<1%	2	8	90	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	7	14	t	1	1
Chlorine	12115				2	2
Iron	12126	5	5	5	2	2
Potassium	12180	5	5	5	5	5
Silicon	12165	10	10	10	10	10
Sulfates	12403	t	t			
Carbon	12116	30	30	30	30	30
(Volatile Carbon)	15101	(15)	(10)	(10)	(10)	(10)
(Carbonates)	12501	(3)	(7)	(t)	(t)	(5)
Subtotal		57	74	50	50	50
Other	(O_2,N_2,P,H_2)	43	26	50	50	50
Total		100	100	100	100	100

† Based on literature data for size distribution (see Section 2.3.3 of Vol. I) and wood waste (hog fuel) boiler data for composition.

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PARTICULATE PROFILE

Title: Forest Fires

Profile Key: 0046

Source of Data:

____ KVB Test

_X_ Literature Data--Ref.*

_X_ Estimate--Basis†

Confidence Level IV

Applicable SCC's

9-13-081-00

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		3	5	12	80	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Calcium	12111	7	14	t	1	1
Chlorine	12115				2	2
Iron	12126	5	5	5	2	2
Potassium	12180	5	5	5	5	5
Silicon	12165	10	10	10	10	10
Sulfates	12403	t	t			
Carbon	12116	30	30	30	30	30
(Volatile Carbon)	15101	(15)	(10)	(10)	(10)	(10)
(Carbonates)	12501	(3)	(7)	(t)	(t)	(5)
Subtotal		57	74	50	50	50
Other	(O_2,N_2,P,H_2)	43	26	50	50	50
Total		100	100	100	100	100

† Based on composition data from wood waste boiler and size distribution from the literature (see Section 2.3.3 of Vol. I).

PARTICULATE PROFILE

Title: Sanitary Landfill Dust

Profile Key: 0047

Source of Data:

____ KVB Test

X Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level III

Applicable SCC's

9-49-000-00

9-49-999-99

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		45	15	12	28	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Aluminum	12101	8	8	8	8	8
Calcium	12111	2	2	2	2	2
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	3	3	3	3	3
Lead	12128	d	d	d	d	d
Manganese	12132	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Potassium	12180	2	2	2	2	2
Silicon	12165	20	20	20	20	20
Titanium	12161	t	t	t	t	t
Vanadium	12164	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Subtotal		35	35	35	35	35
Other	(O_2, P)	65	65	65	65	65
Total		100	100	100	100	100

*Ref. A-9

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PARTICULATE PROFILE

Title: Agricultural Tillage Dust

Profile Key: 0048

Source of Data:

____ KVB Test

X Literature Data--Ref.*

____ Estimate--Basis†

Confidence Level III

Applicable SCC's

9-47-239-00

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		40	21	17	22	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Aluminum	12101	8	8	8	8	8
Barium	12107	d	d	d	d	d
Cadmium	12111	2	2	2	2	2
Cobalt	12113	d	d	d	d	d
Copper	12114	d	d	d	d	d
Iron	12126	3	3	3	3	3
Lead	12128	d	d	d	d	d
Manganese	12132	t	t	t	t	t
Nickel	12136	d	d	d	d	d
Potassium	12180	2	2	2	2	2
Silicon	12165	20	20	20	20	20
Titanium	12161	t	t	t	t	t
Vanadium	12164	d	d	d	d	d
Zinc	12167	d	d	d	d	d
Subtotal		35	35	35	35	35
Other	(O_2, P)	65	65	65	65	65
Total		100	100	100	100	100

*Ref. A-9

PARTICULATE PROFILE

Title: Industrial Boiler (Natural Gas Fuel)

Profile Key: 0049

Applicable SCC's

1-01-006-01, 02, 03

1-02-006-01, 02, 03

1-02-007-01, 02, 03

1-03-006-01, 02, 03

2-01-002-01, 2-02-002-01

Source of Data:

____ KVB Test

____ Literature Data--Ref.*

X Estimate--Basis†

Confidence Level II

Size Range		>10μm	3-10μm	1-3μm	<1μm	Composite
Wt% TSP in Size Range		0	0	0	100	100
Species	SAROAD Code	Wt% of Species in Indicated Size 0.1% < t < 1.0%				d < 0.1%
Sulfates	12403				20	20
Total Carbon	12116				50	50
Subtotal					70	70
Other	(O_2, Na, Cl)				30	30
Total					100	100

†Estimated size destribution based on engineering estimate

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APPENDIX

REFERENCES

A-1 Sittig, M., Particulates and Fine Dust Removal, Noyes Data Corp., 1977, page 201.

A-2 Friedlander, S. K., Smoke, Dust and Haze, 1977, J. Wiler and Sons, Inc., page 20.

A-3 Sittig, M., Particulates and Fine Dust Removal, Noyes Data Corp., 1977, page 292.

A-4 Ibid, page 440.

A-5 Ibid, page 175.

A-6 Ibid, page 250.

A-7 Sittig, M., Particulates and Fine Dust Removal, Noyes Data Corp., 1977, page 293.

A-8 Ibid, page 454.

A-9 Friedlander, S. K., Smoke, Dust and Haze, 1977, page 301.

A-10 The Health Consequences of Smoking, page 94, Table 1, 1975.

A-11 Anonymous, Preliminary Draft of Tire and Brake Emissions in the SCAB, Vehicle Distribution Summary of SCAQMD Areas, South Coast Air Quality Management District, October 1977.

A-12 Sittig, M., Particulates and Fine Dust Removal, Noyes Data Corp., 1977, page 55.

A-13 Alguard, D. A., Snowden, W. D., Stolberg, W. E., Swanson, G. A., Source Sampling Residential Fireplaces for Emission Factor Development, Valentine Fisher, T. Tomlinson, Seattle, Washington, prepared for the Environmental Protection Agency, Research Triangle Park, NC, EPA 450/3-76-010, November, 1975.