

AP42 Section 1.6 Wood Residue Combustion In Boilers

Related:

Title: Working files from contractor from last supplement,
September 2003

Note: This material is related to a section in *AP42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the file number, the AP42 chapter and then the section. The file name "rel01_c01s02.pdf" would mean the file relates to AP42 chapter 1 section 2. The document may be out of date and related to a previous version of the section. The document has been saved for archival and historical purposes. The primary source should always be checked. If current related information is available, it will be posted on the AP42 webpage with the current version of the section.



EASTERN RESEARCH GROUP, INC.

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Morrisville, NC 27560
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25
45
70

FAX COVER SHEET

Date: 3-2-01
To: Ray Huntley
Company: EPA
Fax Number: 541-0684
From: Eric Gruchl Phone Number: 468-7891
No. of Pages to Follow: 2

COMMENTS:

Ray,

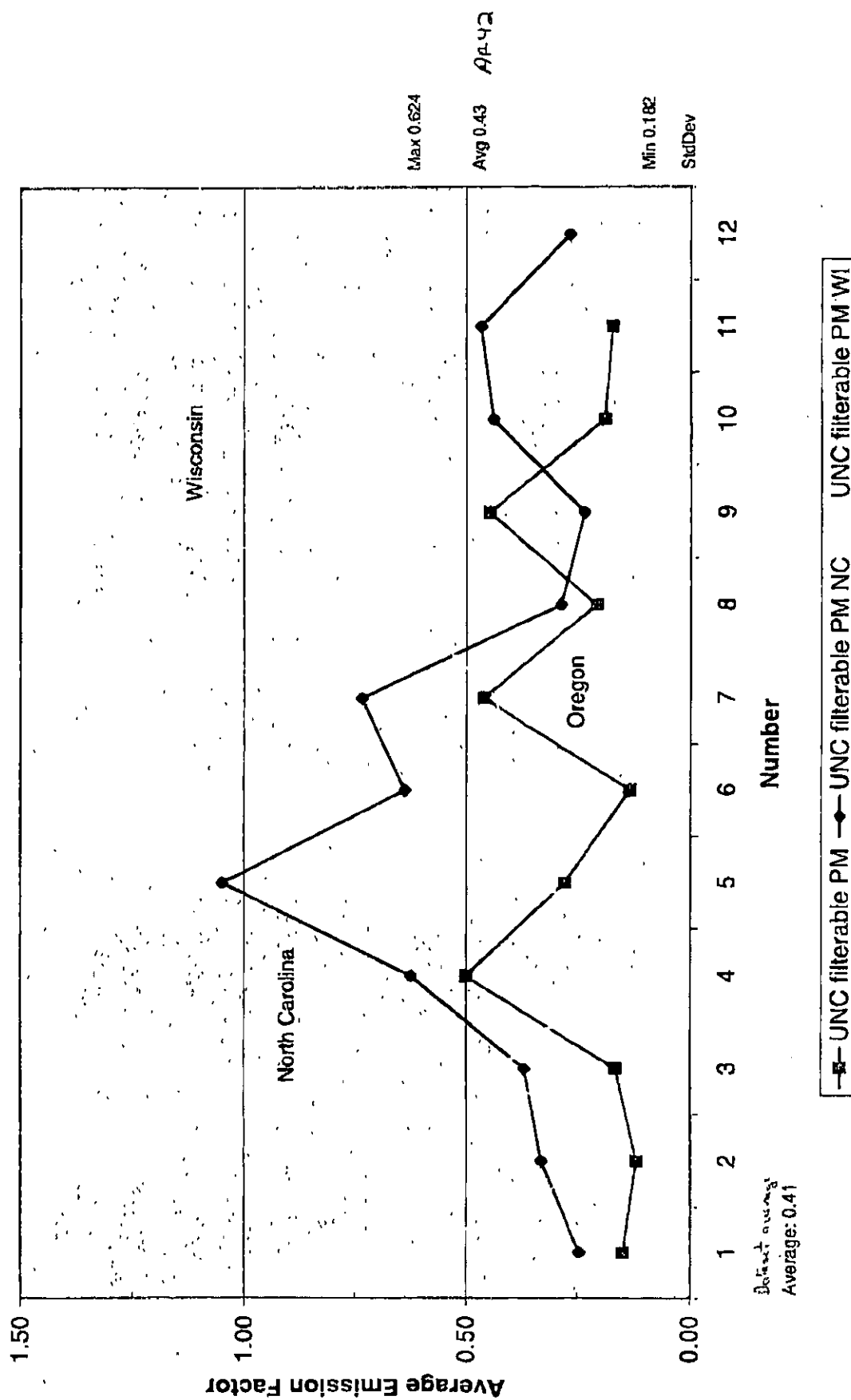
Here are the tables I mentioned

on my message.

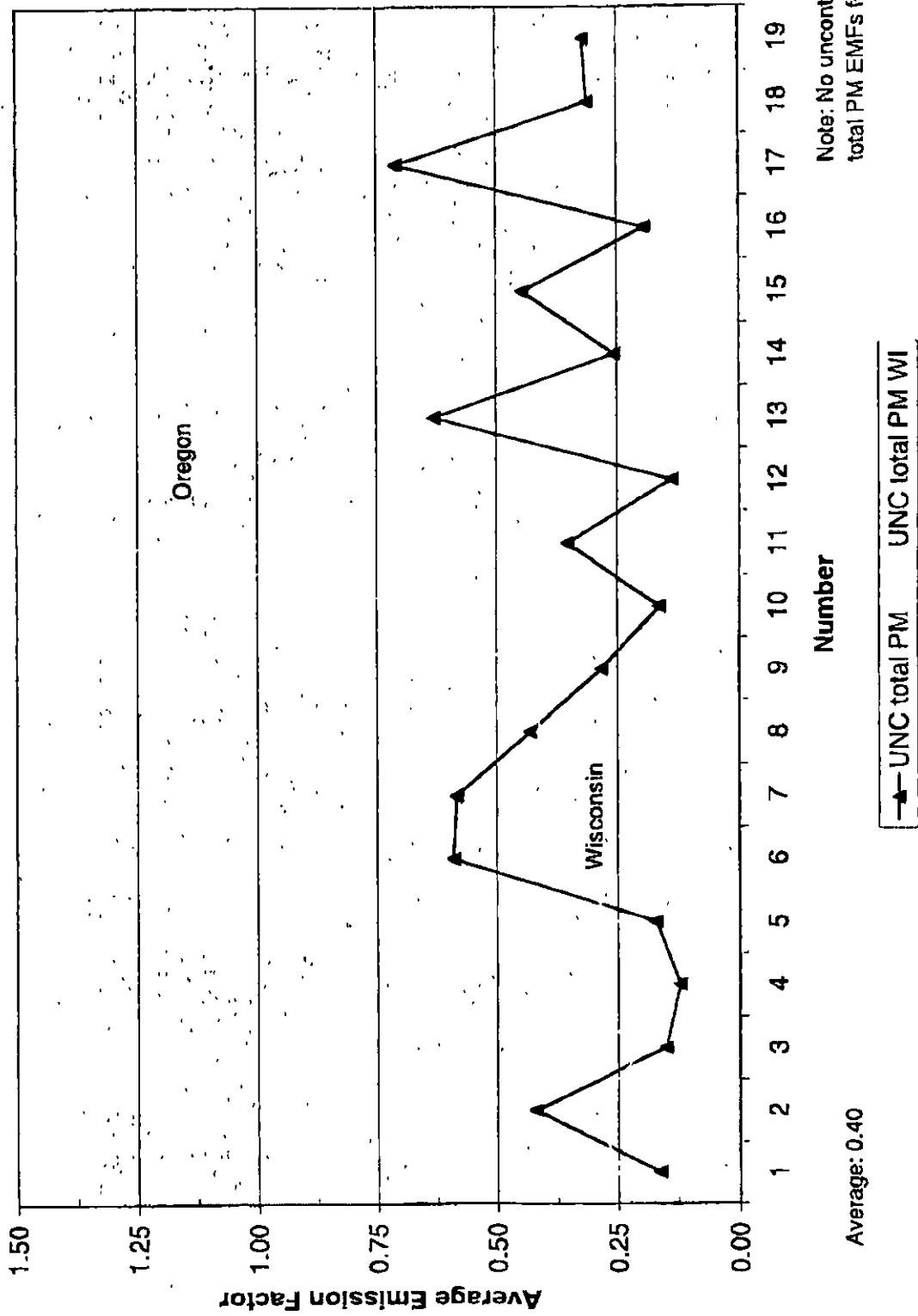
Talk to you around ~1:30.

Eric

Comparison of Uncontrolled filterable PM Average Emission Factors



Comparison of Uncontrolled total PM Average Emission Factors for Oregon and Wisconsin





EASTERN RESEARCH GROUP, INC.

1600 Perimeter Park
Morrisville, NC 27560
Fax: (919) 468-7801

FAX COVER SHEET

Date: 3-15-01
To: Roy Huntley
Company: EPA
Fax Number: 541-0684
From: Eric Guehl Phone Number: 468-7891
No. of Pages to Follow: 4

COMMENTS:

Roy,
Here are the summary tables I
referred to in my memo. These tables
are what we propose to replace the Process.xls table
Jack produced. Currently these tables only contain
Oregon data as any of these columns can be
deleted as you see fit.

Thank you,

Eric

CO Oregon

TEST ID	POLLUTANT	UNIT	SUBTYPE	PRI	CONTROL	FUEL TYPE	NUMBER OF RUNS	AVERAGE	MIN	MAX	STD DEV
2043	CO	Dutch oven				Hogged Fuel	3	0.68	0.49	0.93	0.23
2141	CO	Spreader/Stoker			Wet Scrubber	Hogged Fuel	3	1.88	1.03	2.65	0.82
2154	CO	Dutch oven			Multiclone	Hogged Fuel	3	0.44	0.27	0.72	0.24
2158	CO	Dutch oven			Multiclone	Hogged Fuel	3	0.70	0.59	0.78	0.09
2162	CO	Dutch oven			Multiclone	Hogged Fuel	3	0.54	0.45	0.62	0.09
2166	CO	Dutch oven			Multiclone	Hogged Fuel	3	0.72	0.65	0.82	0.09
2260	CO	Wellons Fuel Cell			Cyclone	Hogged Fuel	2	0.09	0.09	0.10	0.01
2335	CO	Spreader/Stoker, fixedgrate			Multiclone	Hogged Wood Waste	2	0.60	0.60	0.60	0.00
2337	CO	Spreader/Stoker, fixedgrate			Multiclone	Sanderdust	6	0.29	0.25	0.38	0.07
2356	CO	Spreader/Stoker, fixedgrate			Multiclone	Sanderdust	6	1.00	0.33	1.71	0.62
2372	CO	Spreader/Stoker, fixedgrate			Multiclone	Sanderdust	2	0.59	0.58	0.61	0.02
2375	CO	Spreader/Stoker, fixedgrate			Multiclone	Sanderdust	1	0.56	0.56	0.56	0.00
2402	CO	Dutch oven			Wet Scrubber	Fir	3	0.54	0.46	0.64	0.09
2415	CO	Dutch oven			Wet Scrubber	Wood Waste	3	0.63	0.45	0.80	0.18
2419	CO	Dutch oven			Wet Scrubber	Wood Waste	6	1.25	0.76	1.90	0.48
2435	CO	Spreader/Stoker			Wet Scrubber	Hogged Fuel	3	1.04	0.77	1.35	0.29
2439	CO	Dutch oven			Wet Scrubber	Wood Waste	10	0.88	0.47	1.81	0.42
2450	CO	Dutch oven			Wet Scrubber	Wood Waste	6	0.51	0.33	0.68	0.15
2458	CO	Stoker			Wet Scrubber	Hogged Fuel	3	0.64	0.53	0.73	0.11
2459	CO	Stoker			Wet Scrubber	Hogged Fuel	3	1.12	1.03	1.26	0.14
2633	CO	Coen				Sanderdust	3	0.82	0.56	1.04	0.24
2641	CO	Coen				Sanderdust	3	0.03	0.01	0.05	0.02
2689	CO	Coen				Sanderdust	3	0.70	0.51	0.96	0.24
2696	CO	Dutch oven				Hogged Fuel	12	1.29	0.16	4.32	1.52
2743	CO	Dutch oven			Multiclone	Hogged Fuel	5	1.05	0.57	1.41	0.37
2750	CO	Dutch oven			Multiclone	Hogged Fuel	2	0.20	0.09	0.31	0.16
3284	CO	Spreader/Stoker			Multiclone	Hogged Fuel	3	0.23	0.13	0.29	0.08
3288	CO	Spreader/Stoker			Multiclone	Hogged Fuel	3	1.42	0.90	1.81	0.47
3292	CO	Spreader/Stoker			Multiclone	Hogged Fuel	3	0.15	0.05	0.33	0.16
3934	CO	Stoker			Multiclone	Hogged Wood Waste	3	0.12	0.10	0.14	0.02
3950	CO	Dutch oven				Hogged Fuel	3	0.53	0.38	0.68	0.15
4426	CO	Wellons Fuel Cell				Hogged Fuel	3	0.19	0.17	0.22	0.03
4450	CO	Stoker			Wet Scrubber	Douglas Fir fuel(HF)	1	0.27	0.27	0.27	0.00
4620	CO	Wellons Fuel Cell			Multiclone	Hogged Wood Waste	3	0.07	0.06	0.09	0.02
4732	CO	Stoker			Multiclone	Hogged Fuel	3	0.39	0.29	0.50	0.11
4736	CO	Stoker			Multiclone	Hogged Fuel	1	2.42	2.42	2.42	0.00
4799	CO	Dutch oven			Multiclone	Hogged Fuel	3	0.30	0.17	0.46	0.15
4803	CO	Dutch oven			Multiclone	Hogged Fuel	3	0.24	0.20	0.29	0.05
4807	CO	Dutch oven			Multiclone	Hogged Fuel	3	0.32	0.27	0.36	0.05
4811	CO	Wellons Fuel Cell			Multiclone	Wood Waste	3	0.09	0.06	0.11	0.03
4988	CO	Spreader/Stoker, fixedgrate			Multiclone	Douglas Fir fuel(HF)	2	1.07	0.99	1.14	0.10
5041	CO	Dutch oven			Wet Scrubber	Wood Waste	4	2.58	1.58	3.35	0.73
5163	CO	Spreader/Stoker			Wet Scrubber	Hogged Fuel	3	1.11	0.90	1.29	0.20

CO Average for Oregon

POLLUTANT	AVERAGE	MIN	MAX	STD DEV
CO	0.70	0.01	4.32	0.29

NOX

TEST ID	POLLUTANT	UNIT	SUBTYPE	PRI	CONTROL	FUEL TYPE	NUMBER OF RUNS	AVERAGE	MIN	MAX	STD DEV
2043	NOx		Dutch oven			Hogged Fuel	3	0.21	0.19	0.22	0.02
2141	NOx		Spreader/Stoker		Wet Scrubber	Hogged Fuel	3	0.15	0.13	0.18	0.02
2154	NOx		Dutch oven		Multiclone	Hogged Fuel	3	0.21	0.20	0.23	0.01
2158	NOx		Dutch oven		Multiclone	Hogged Fuel	3	0.20	0.20	0.20	0.00
2162	NOx		Dutch oven		Multiclone	Hogged Fuel	3	0.14	0.13	0.14	0.00
2166	NOx		Dutch oven		Multiclone	Hogged Fuel	3	0.12	0.11	0.12	0.00
2250	NOx		Wetlans Fuel Cell		Cyclone	Hogged Fuel	1	0.21	0.21	0.21	0.00
2335	NOx		Spreader/Stoker fixedgrate		Multiclone	Hogged Wood Waste	2	0.22	0.22	0.22	0.00
2337	NOx		Spreader/Stoker fixedgrate		Multiclone	Sanderdust	6	0.35	0.33	0.37	0.02
2356	NOx		Spreader/Stoker fixedgrate		Multiclone	Sanderdust	6	0.13	0.06	0.21	0.07
2372	NOx		Spreader/Stoker fixedgrate		Multiclone	Sanderdust	2	0.33	0.32	0.33	0.01
2375	NOx		Spreader/Stoker fixedgrate		Multiclone	Sanderdust	1	0.33	0.33	0.33	0.01
2402	NOx		Dutch oven		Wet Scrubber	Fir	3	0.15	0.14	0.15	0.01
2415	NOx		Dutch oven		Wet Scrubber	Wood Waste	3	0.20	0.19	0.21	0.01
2419	NOx		Dutch oven		Wet Scrubber	Wood Waste	6	0.16	0.15	0.18	0.01
2435	NOx		Spreader/Stoker		Wet Scrubber	Hogged Fuel	3	0.22	0.21	0.25	0.02
2439	NOx		Dutch oven		Wet Scrubber	Wood Waste	10	0.21	0.12	0.31	0.07
2450	NOx		Dutch oven		Wet Scrubber	Wood Waste	6	0.26	0.20	0.37	0.07
2458	NOx		Stoker		Wet Scrubber	Hogged Fuel	3	0.22	0.21	0.23	0.01
2459	NOx		Stoker		Wet Scrubber	Hogged Fuel	3	0.18	0.17	0.19	0.01
2633	NOx		Coen			Sanderdust	3	0.88	0.79	0.98	0.10
2641	NOx		Coen			Sanderdust	3	1.28	1.23	1.33	0.05
2689	NOx		Coen			Sanderdust	3	1.00	0.91	1.07	0.08
2689	NOx		Dutch oven			Hogged Fuel	12	0.28	0.25	0.32	0.02
2743	NOx		Dutch oven		Multiclone	Hogged Fuel	6	0.16	0.11	0.21	0.04
2750	NOx		Dutch oven		Multiclone	Hogged Fuel	2	0.20	0.18	0.22	0.03
3284	NOx		Spreader/Stoker		Multiclone	Hogged Fuel	3	0.29	0.27	0.30	0.01
3289	NOx		Spreader/Stoker		Multiclone	Hogged Fuel	3	0.24	0.24	0.25	0.00
3292	NOx		Spreader/Stoker		Multiclone	Hogged Fuel	3	0.28	0.27	0.29	0.01
3934	NOx		Stoker		Multiclone	Hogged Wood Waste	3	0.18	0.17	0.19	0.01
3950	NOx		Dutch oven			Hogged Fuel	3	0.17	0.16	0.17	0.01
4426	NOx		Wetlans Fuel Cell			Hogged Fuel	3	0.23	0.23	0.24	0.00
4550	NOx		Stoker		Wet Scrubber	Douglas Fir fuel(HF)	1	0.14	0.14	0.14	0.01
4620	NOx		Wetlans Fuel Cell		Multiclone	Hogged Wood Waste	3	0.14	0.13	0.15	0.01
4732	NOx		Stoker		Multiclone	Hogged Fuel	3	0.16	0.15	0.17	0.01
4736	NOx		Stoker		Multiclone	Hogged Fuel	1	0.08	0.08	0.08	0.01
4799	NOx		Dutch oven		Multiclone	Hogged Fuel	3	0.13	0.13	0.14	0.01
4803	NOx		Dutch oven		Multiclone	Hogged Fuel	3	0.13	0.13	0.14	0.00
4807	NOx		Dutch oven		Multiclone	Hogged Fuel	3	0.13	0.13	0.14	0.00
4811	NOx		Wetlans Fuel Cell		Multiclone	Wood Waste	3	0.19	0.18	0.20	0.01
4998	NOx		Spreader/Stoker fixedgrate		Multiclone	Douglas Fir fuel(HF)	2	0.26	0.23	0.29	0.04
5041	NOx		Dutch oven		Wet Scrubber	Wood Waste	4	0.21	0.19	0.24	0.03
5163	NOx		Spreader/Stoker		Wet Scrubber	Hogged Fuel	3	0.14	0.12	0.18	0.03

NOX Average for Oregon

POLLUTANT	AVERAGE	MIN	MAX	STD DEV
NOx	0.261	0.061	1.331	0.021



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Date: 3/29/01
To: Roy Hunley
Company: EPA
Fax Number: 541-0684
From: Eric Guehl Phone Number: 468-7891
No. of Pages to Follow: 1

COMMENTS:

Roy,
Here is the graph we talked about
in our meeting Tuesday. Let me know
if you would like the spreadsheet with
the numbers used to plot this graph.
Eric



EASTERN RESEARCH GROUP, INC.

CALCULATION SHEET

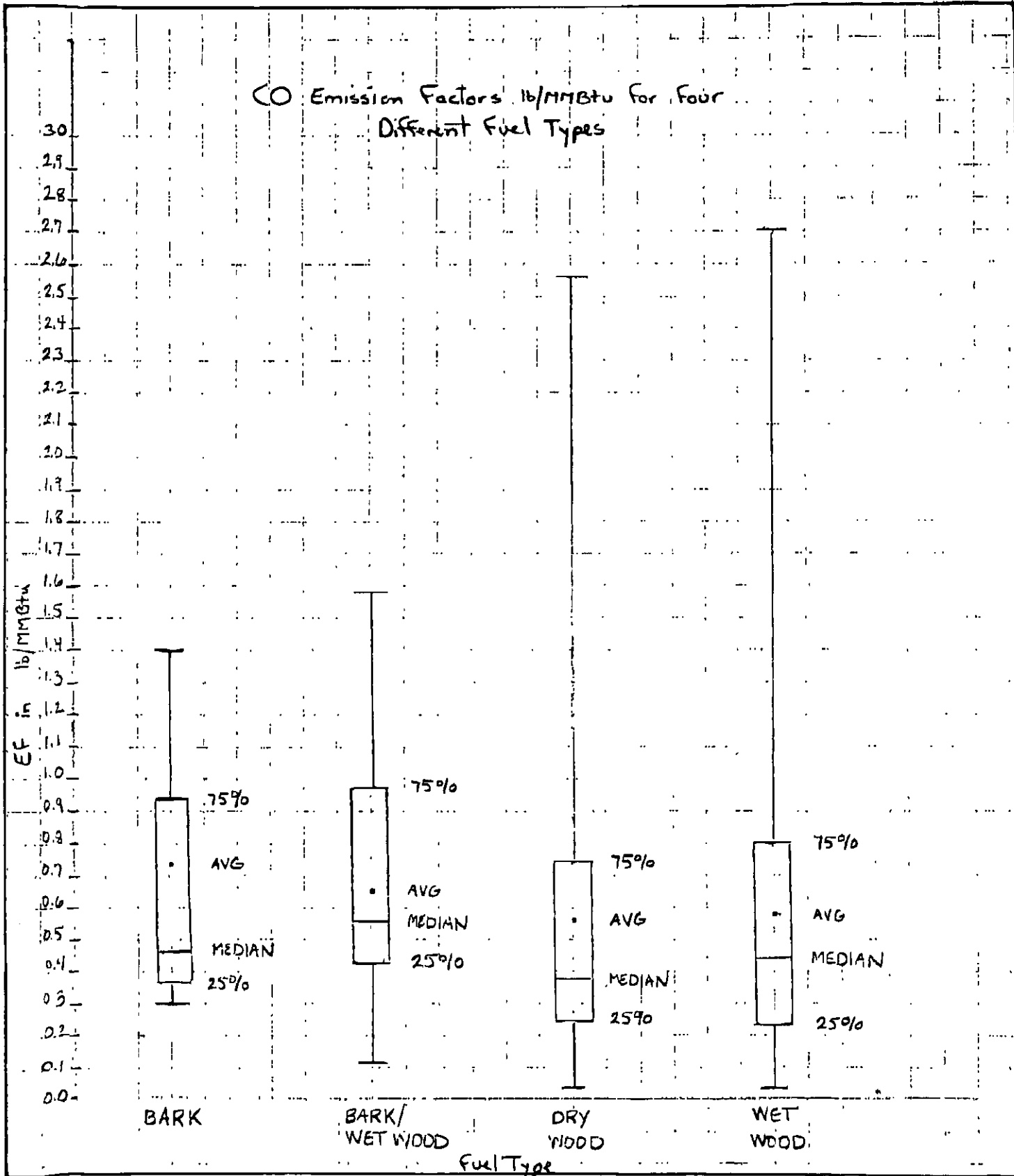
CALC. NO. _____

SIGNATURE _____ DATE 3/29/01 CHECKED _____ DATE _____

PROJECT _____ JOB NO. _____

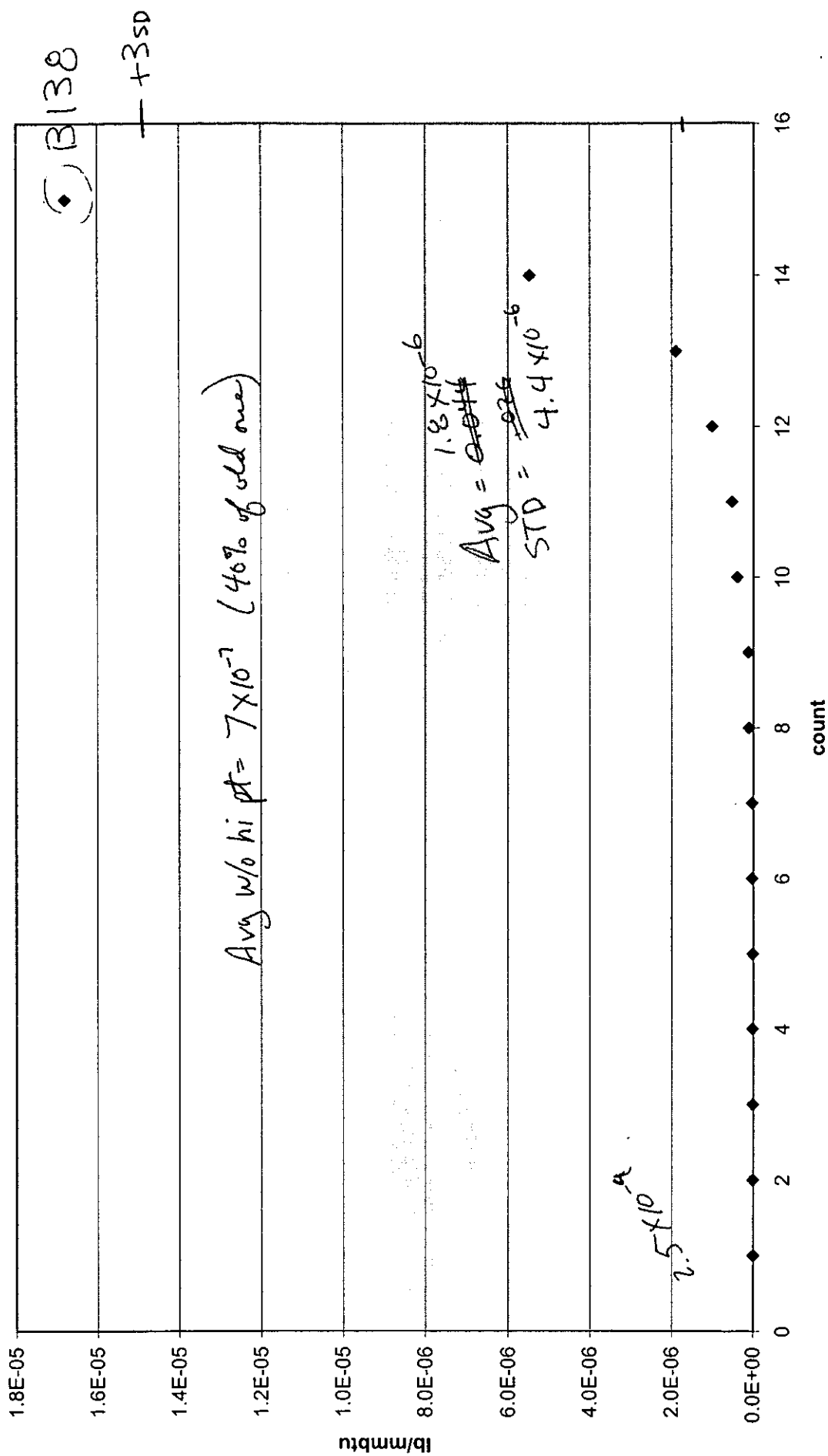
SUBJECT _____ SHEET _____ OF _____ SHEETS

CO Emission Factors lb/MMBtu for Four Different Fuel Types

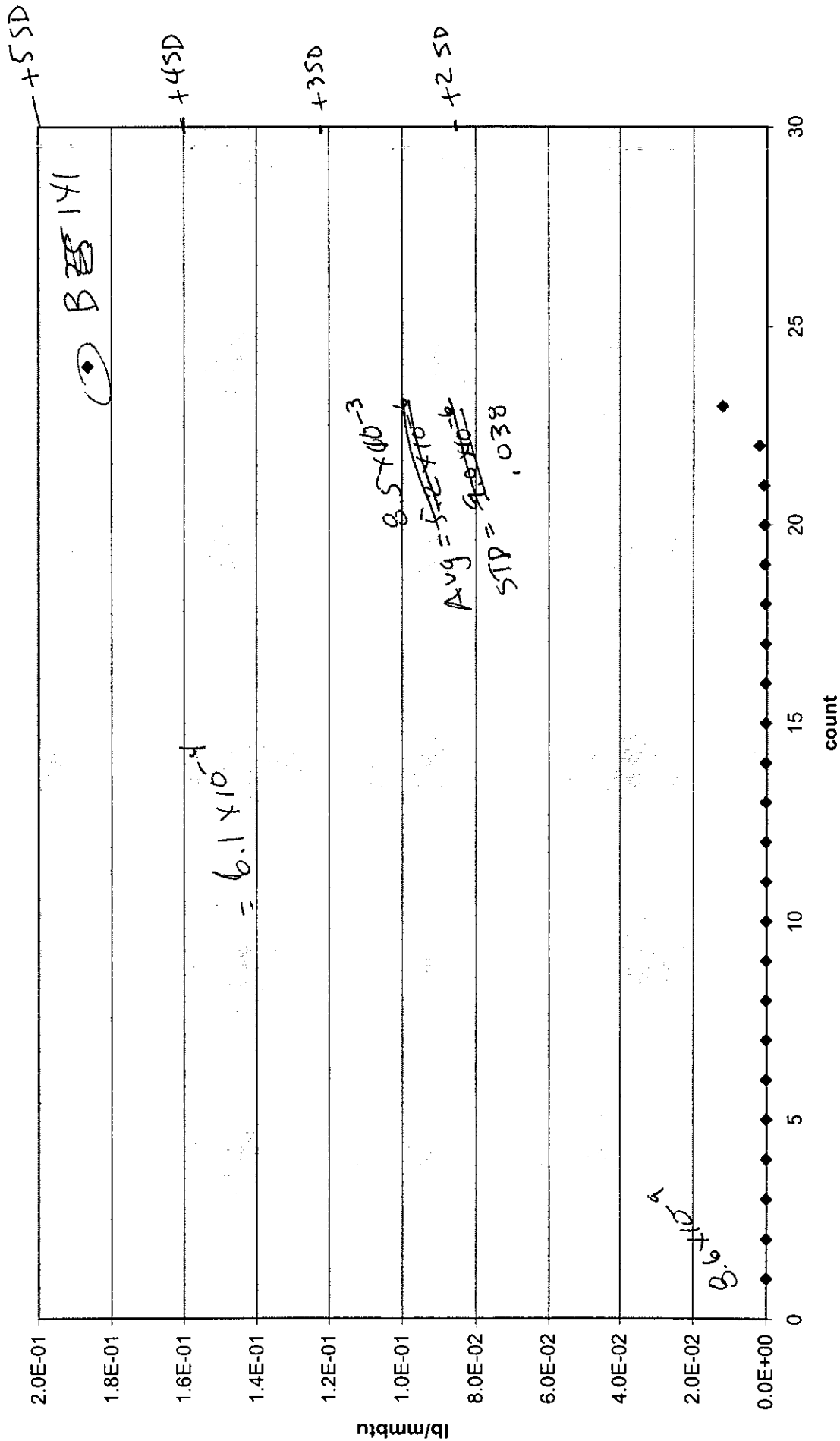


REF ID	TEST ID	FACILITY NAME	FACILITY LOCATION	COMB ID	MANUFACTURER	POLLUTANTS	MODEL #	FIRING CONFIG	UNIT DESC
ICCR	E650.001	Wood Preservers, Inc.	Warsaw, VA	B138	0	Acenaphthene	0	0	0
ICCR	E650.002	Wood Preservers, Inc.	Warsaw, VA	B138	0	hexachlorodibenzo-p-dioxins	0	0	0
ICCR	E650.007	Wood Preservers, Inc.	Warsaw, VA	B138	0	octachlorodibenzo-p-dioxins	0	0	0
ICCR	E651.001	Wood Preservers, Inc.	Warsaw, VA	B138	Babcock & Wilcox	Acetaldehyde	0	0	Wood Fired Boiler
ICCR	E661.001	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.002	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.003	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.004	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.005	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.006	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.007	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.008	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.009	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.011	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.012	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
ICCR	E661.010	Wood-Mode, Inc.	Kremer, PA	B141	E. Keeler	Formaldehyde	CP-350	0	Wood-fired boiler used to kiln dry hardwood lumber used in the manufacture of
E272	AP37.01	Georgia Pacific	Fort Bragg, CA	B45	Riley Stoker	Benzox(h)pyrene	1982 Stoker	0	Wood fired boiler, installed 1982.
E272	AP37.02	Georgia Pacific	Fort Bragg, CA	B45	Riley Stoker	Benzox(h)fluoranthene	1982 Stoker	0	Wood fired boiler, installed 1982.
E272	AP37.03	Georgia Pacific	Fort Bragg, CA	B45	Riley Stoker	Chrysene	1982 Stoker	0	Wood fired boiler, installed 1982.
E272	AP37.04	Georgia Pacific	Fort Bragg, CA	B45	Riley Stoker	Fluoranthene	1982 Stoker	0	Wood fired boiler, installed 1982.
E272	AP37.05	Georgia Pacific	Fort Bragg, CA	B45	Riley Stoker	Dibenz(a,h)anthracene	1982 Stoker	0	Wood fired boiler, installed 1982.
E278	AP43.01	Rosenburg Forest Products	Anderson, CA	B100	Garnet & Shofar	Chlorophenol-2	1949	Dutch Oven	Dutch oven boiler
E278	AP43.02	Rosenburg Forest Products	Anderson, CA	B100	Garnet & Shofar	2-Nitrophenol	1949	Dutch Oven	Dutch oven boiler
E278	AP43.03	Rosenburg Forest Products	Anderson, CA	B100	Garnet & Shofar	Chrysene	1949	Dutch Oven	Dutch oven boiler
E278	AP43.04	Rosenburg Forest Products	Anderson, CA	B100	Garnet & Shofar	Fluoranthene	1949	Dutch Oven	Dutch oven boiler
E278	AP43.05	Rosenburg Forest Products	Anderson, CA	B100	Garnet & Shofar	Benzo(a)pyrene	1949	Dutch Oven	Dutch oven boiler
ICCR	E625.001	Mead Corporation	Chillicothe, OH	B78	0	Benzene	0	0	Wood waste boiler at paper mill.
ICCR	E625.002	Mead Corporation	Chillicothe, OH	B78	0	0	0	0	Wood waste boiler at paper mill.
ICCR	E625.003	Mead Corporation	Chillicothe, OH	B78	0	0	0	0	Wood waste boiler at paper mill.
ICCR	E626.001	Mead Corporation	Chillicothe, OH	B78	0	0	0	0	Wood waste boiler at paper mill.
ICCR	E265.001	Pacific Oroville Power Corp	Oroville, CA	B93	Zum	dichlorobenzene	0	Stoker	Two spreader stoker wood-fired boilers in parallel
ICCR	E265.002	Pacific Oroville Power Corp	Oroville, CA	B93	Zum	dichlorobiphenyl	0	Stoker	Two spreader stoker wood-fired boilers in parallel
ICCR	E265.003	Pacific Oroville Power Corp	Oroville, CA	B93	Zum	fluoranthene	0	Stoker	Two spreader stoker wood-fired boilers in parallel
ICCR	E265.004	Pacific Oroville Power Corp	Oroville, CA	B93	Zum	hexachlorobenzene	0	Stoker	Two spreader stoker wood-fired boilers in parallel
ICCR	E265.005	Pacific Oroville Power Corp	Oroville, CA	B93	Zum	trichlorobenzene	0	Stoker	Two spreader stoker wood-fired boilers in parallel
ICCR	E265.006	Pacific Oroville Power Corp	Oroville, CA	B93	Zum	0	0	0	Two spreader stoker wood-fired boilers in parallel
ICCR	E265.007	Pacific Oroville Power Corp	Oroville, CA	B93	Zum	0	0	0	Two spreader stoker wood-fired boilers in parallel
ICCR	E724.018	Craven County Wood Energy	New Bern, NC	B29	Zum	benzaldehyde	0	Stoker	Wood fired boiler comprised of a conventional Zum traveling grate spreader st
ICCR	E724.011	Craven County Wood Energy	New Bern, NC	B29	Zum	big(2-chloroisopropyl) ether,	0	Stoker	Wood fired boiler comprised of a conventional Zum traveling grate spreader st
ICCR	E724.010	Craven County Wood Energy	New Bern, NC	B29	Zum	2-butanone (MEQ)	0	Stoker	Wood fired boiler comprised of a conventional Zum traveling grate spreader st
ICCR	E724.012	Craven County Wood Energy	New Bern, NC	B29	Zum	hexachlorobenzene	0	Stoker	Wood fired boiler comprised of a conventional Zum traveling grate spreader st
ICCR	E724.013	Craven County Wood Energy	New Bern, NC	B29	Zum	n-butylaldehyde	0	Stoker	Wood fired boiler comprised of a conventional Zum traveling grate spreader st
ICCR	E724.014	Craven County Wood Energy	New Bern, NC	B29	Zum	valeraldehyde	0	Stoker	Wood fired boiler comprised of a conventional Zum traveling grate spreader st
ICCR	E724.015	Craven County Wood Energy	New Bern, NC	B29	Zum	0	0	0	Wood fired boiler comprised of a conventional Zum traveling grate spreader st
ICCR	E724.016	Craven County Wood Energy	New Bern, NC	B29	Zum	0	0	0	Wood fired boiler comprised of a conventional Zum traveling grate spreader st
E266	AP22.02	Not Reported	Not Reported	B88	0	benzo(a)pyrene	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.03	Not Reported	Not Reported	B88	0	dichlorobenzene	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.04	Not Reported	Not Reported	B88	0	dichlorobiphenyl	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.05	Not Reported	Not Reported	B88	0	1,2-Dichloroethane	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.06	Not Reported	Not Reported	B88	0	heptachlorobiphenyl	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.07	Not Reported	Not Reported	B88	0	hexachlorobenzene	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.08	Not Reported	Not Reported	B88	0	hexachlorobiphenyl	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.09	Not Reported	Not Reported	B88	0	heptachlorodibenzo-p-dioxin	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.10	Not Reported	Not Reported	B88	0	monochlorobiphenyl	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.11	Not Reported	Not Reported	B88	0	monochlorophenol, pentachlor	0	FBC	Waste-wood fired boiler, fluidized bed.
E266	AP22.12	Not Reported	Not Reported	B88	0	octachlorodibenzo-p-dioxins	0	FBC	Waste-wood fired boiler, fluidized bed.

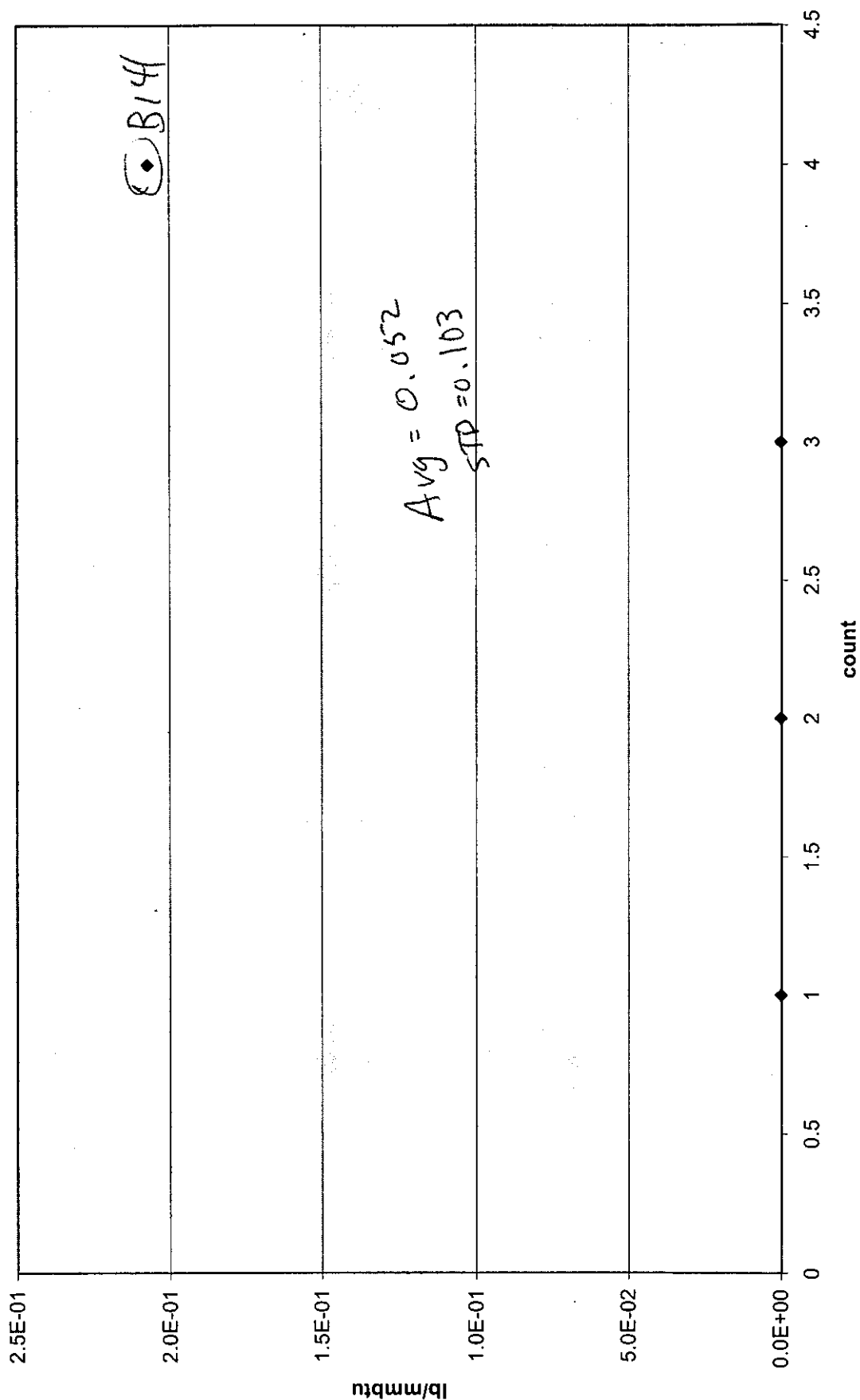
Acenaphthene



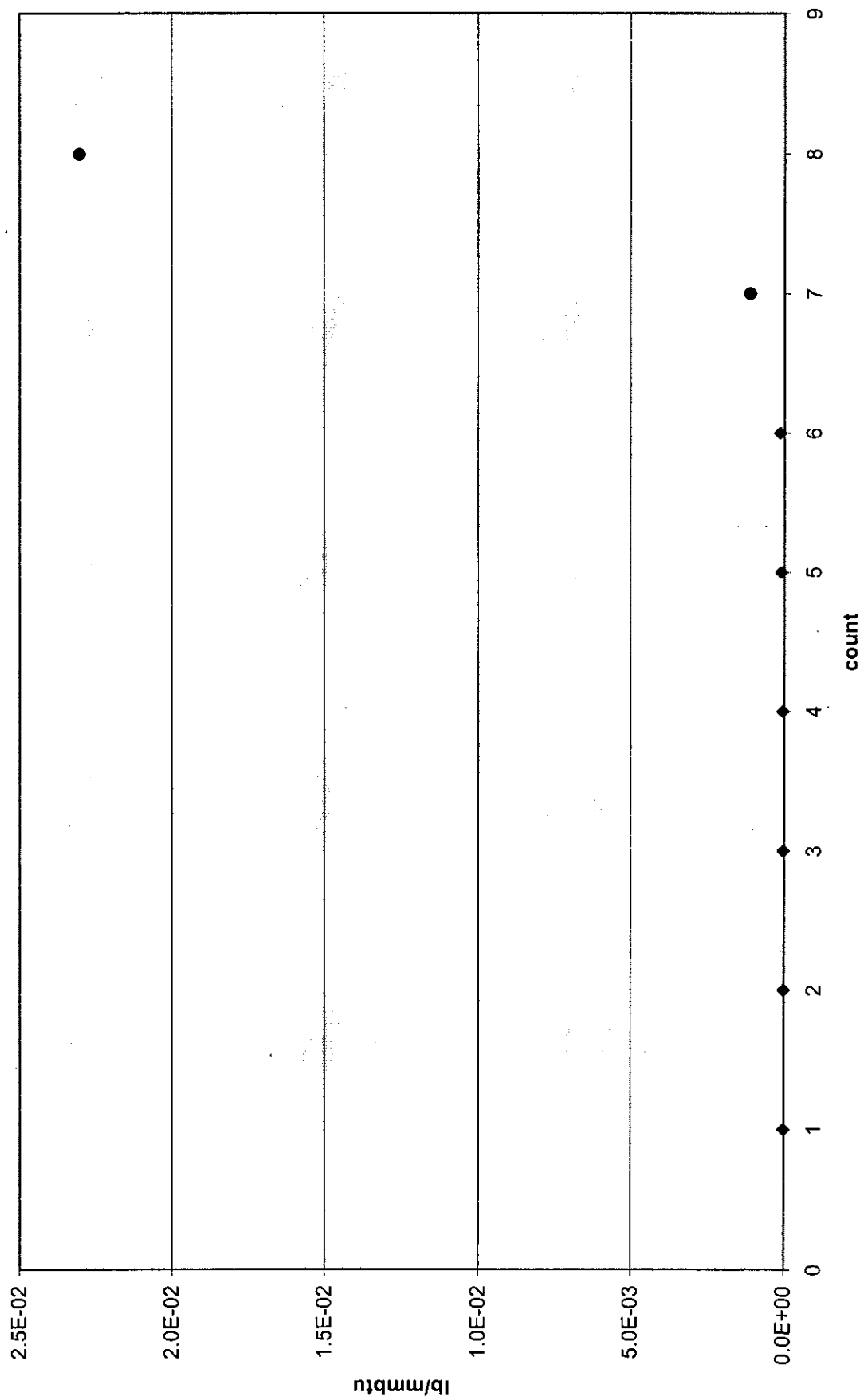
Acetaldehyde



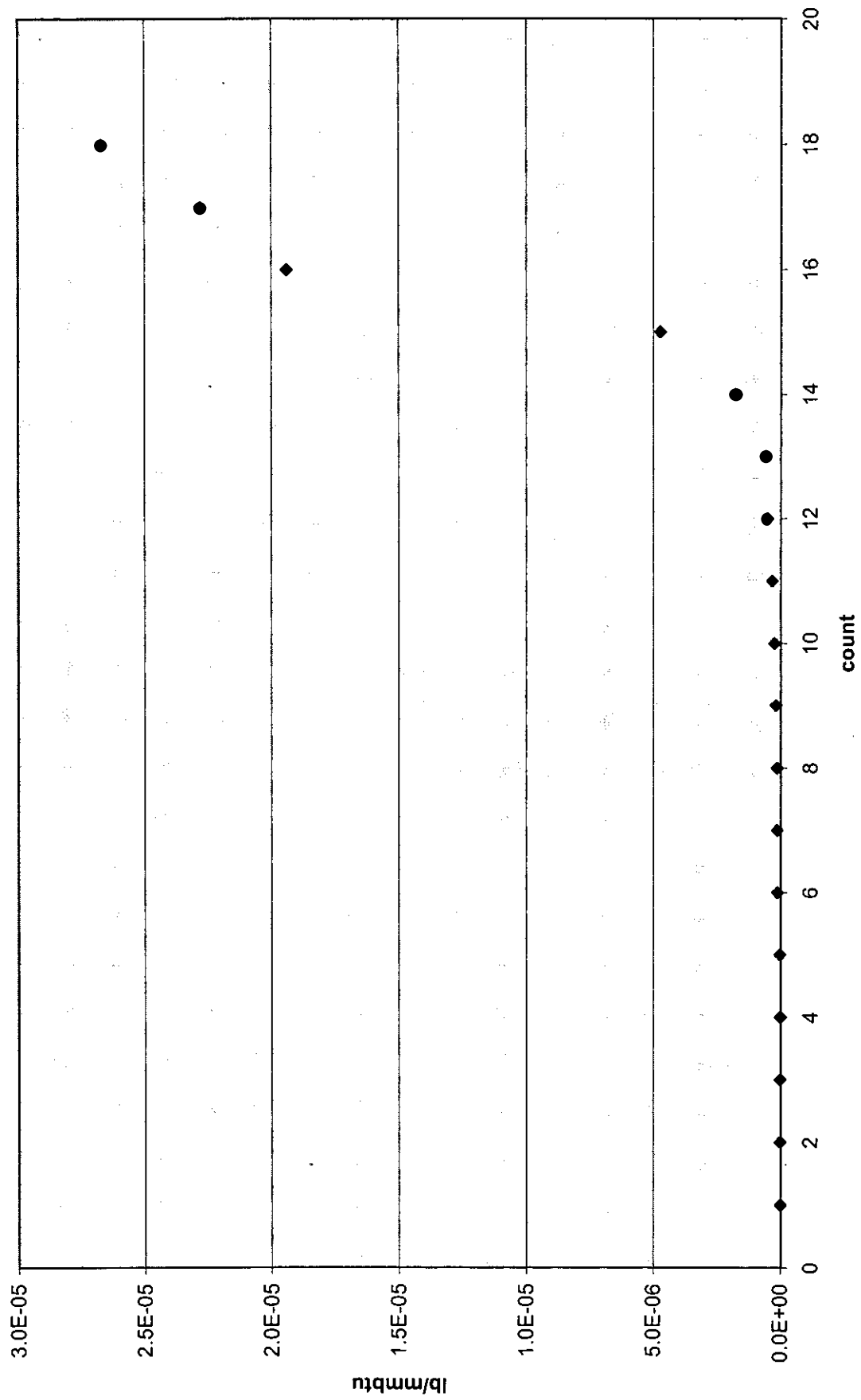
Acetone



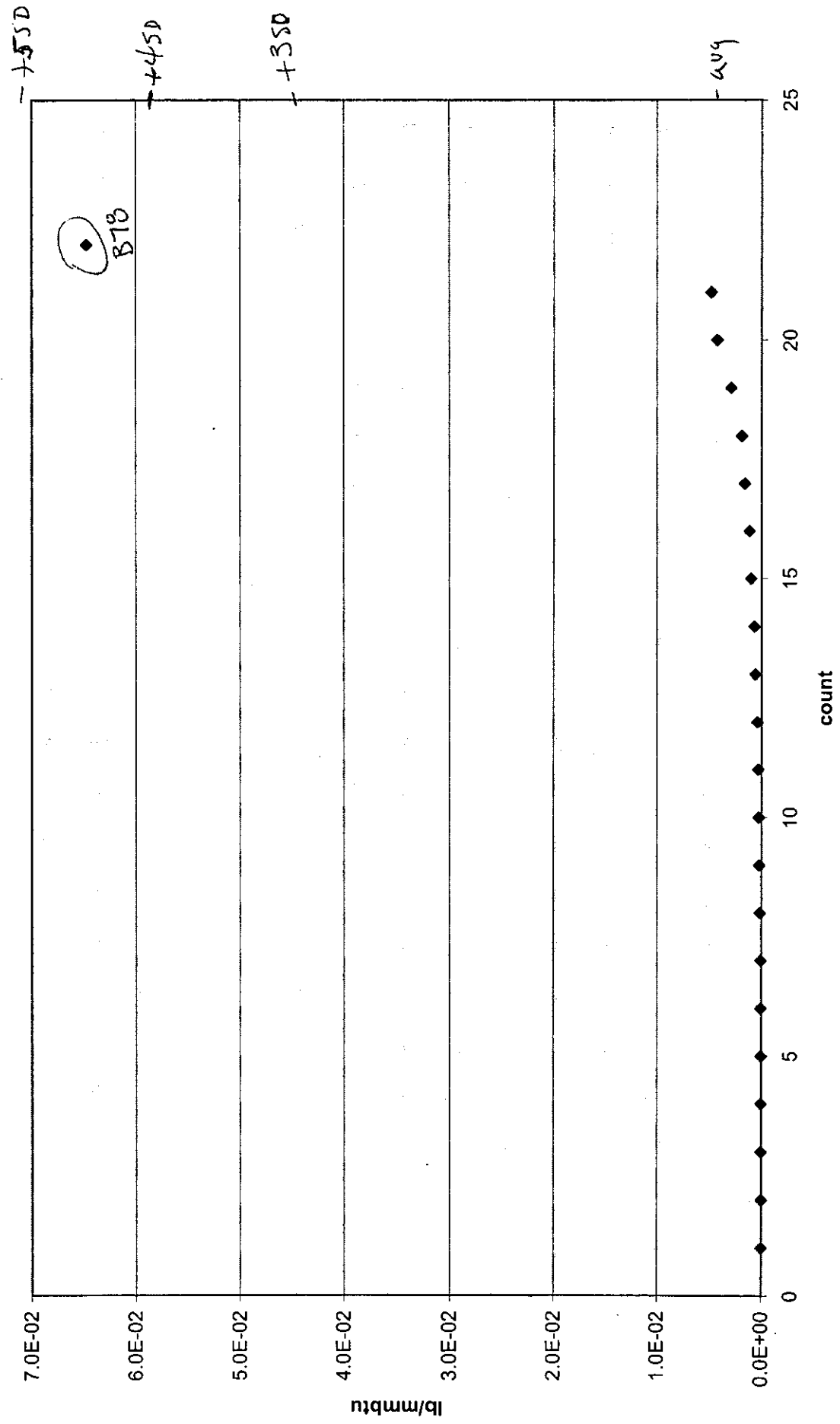
Acrolein



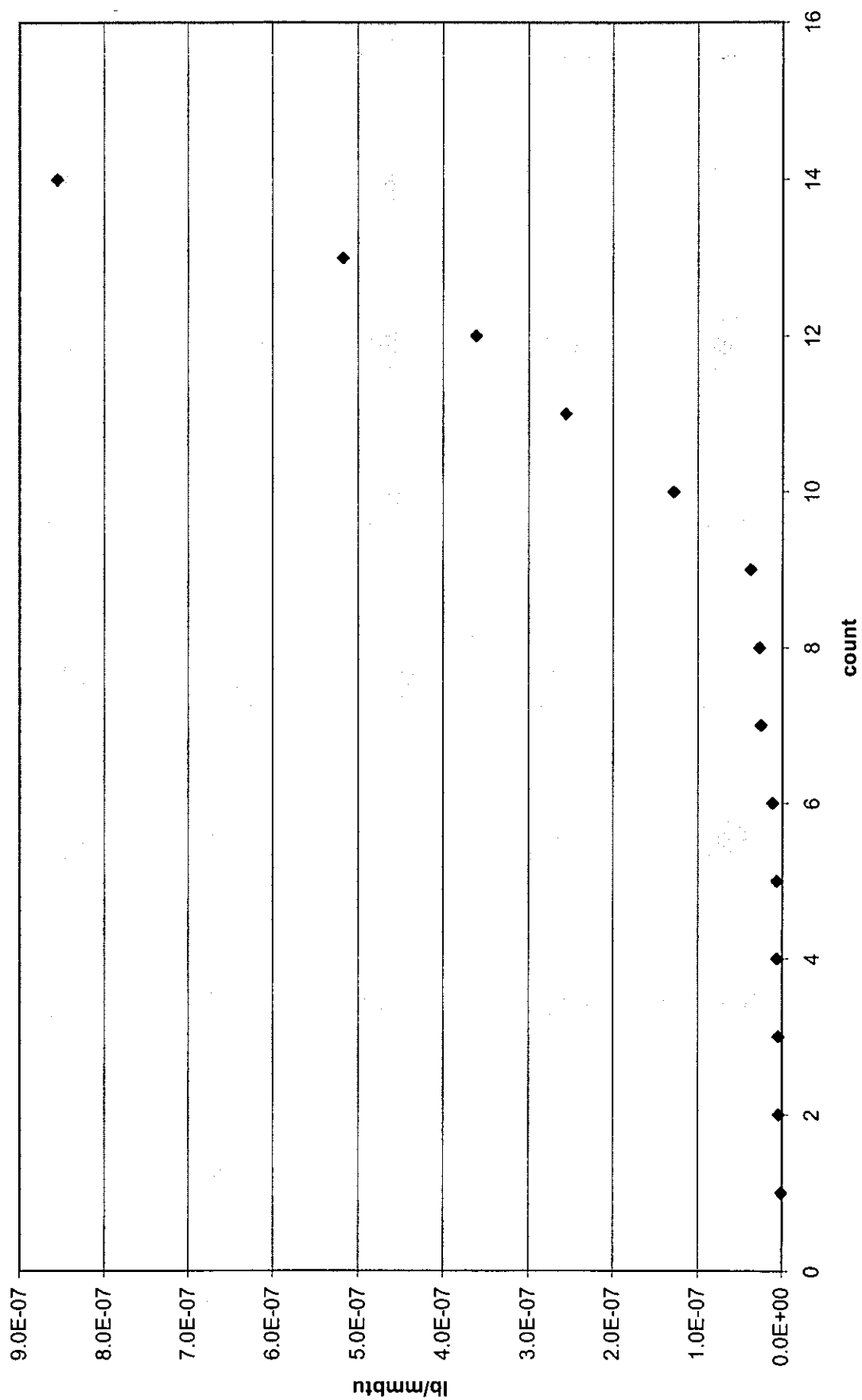
Anthracene



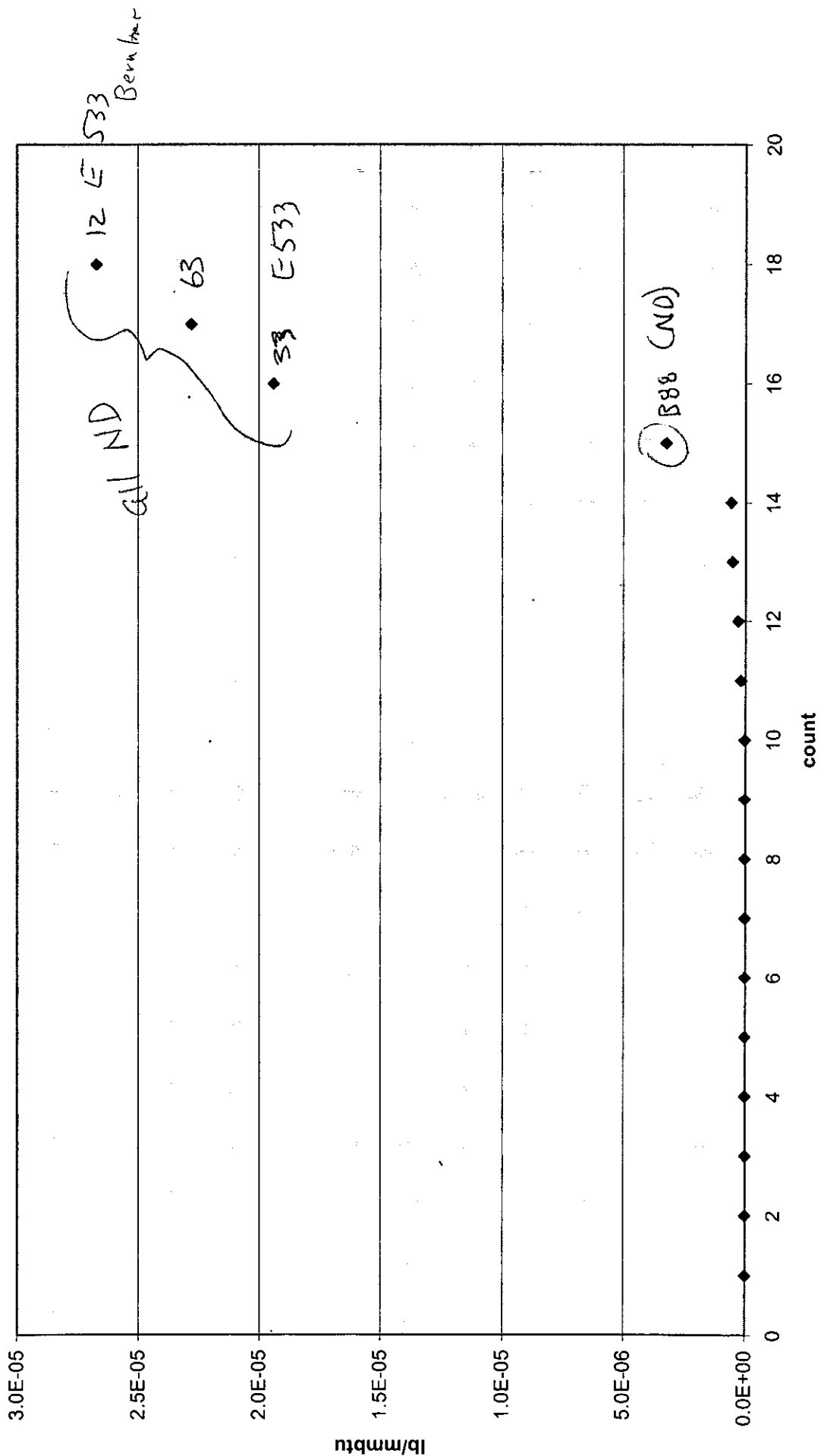
Benzene



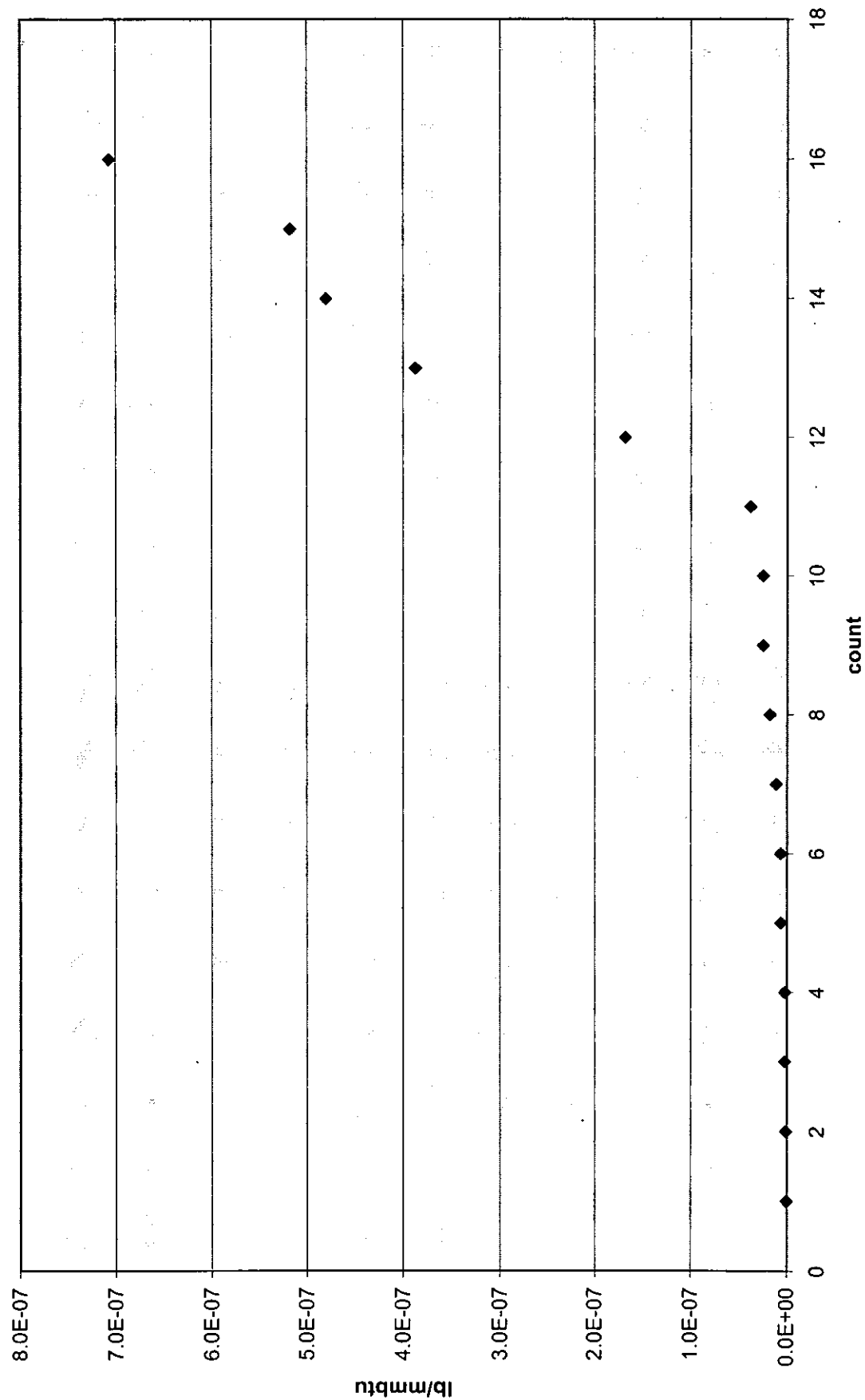
Benzo(a)anthracene



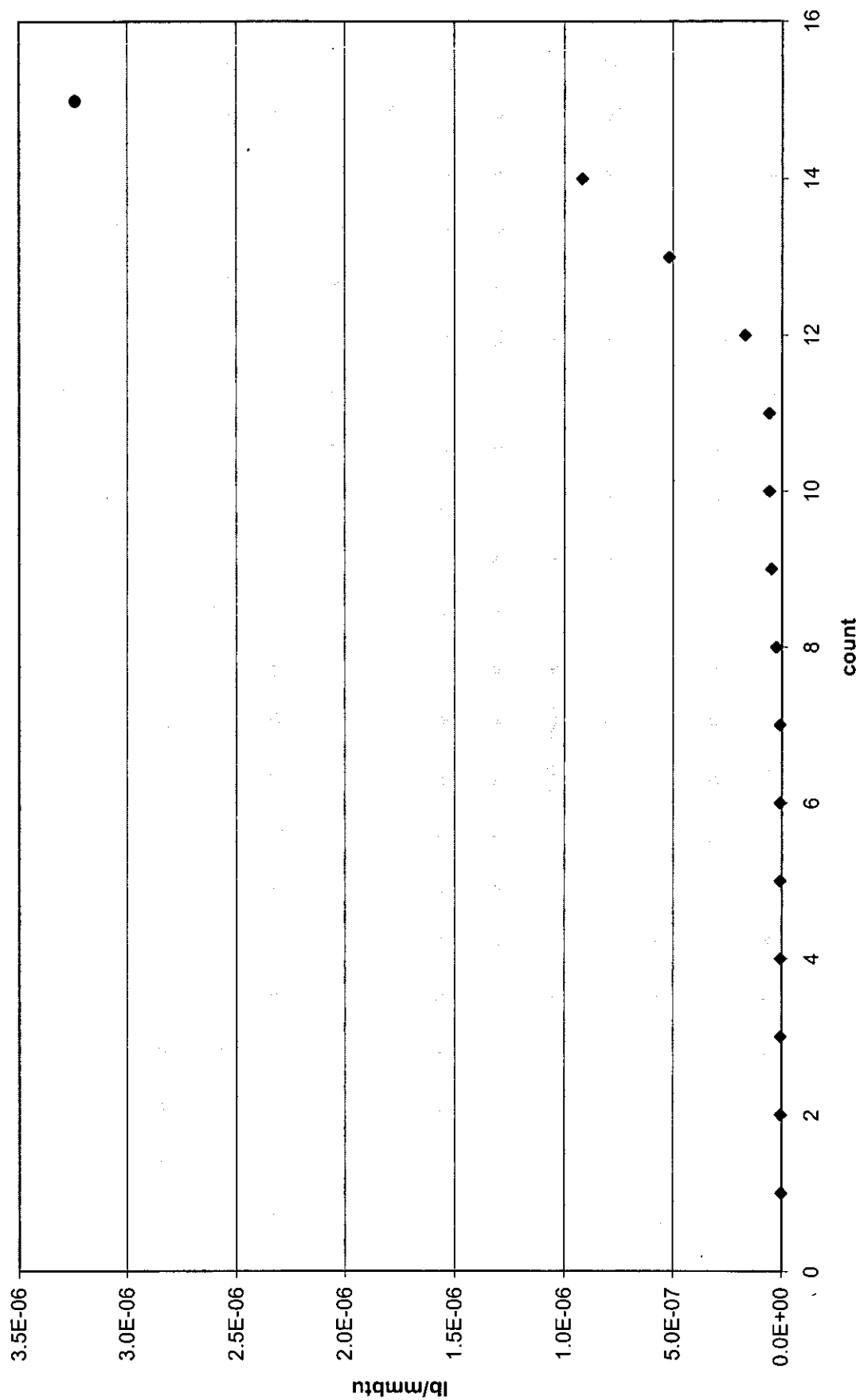
Benzo(a)pyrene



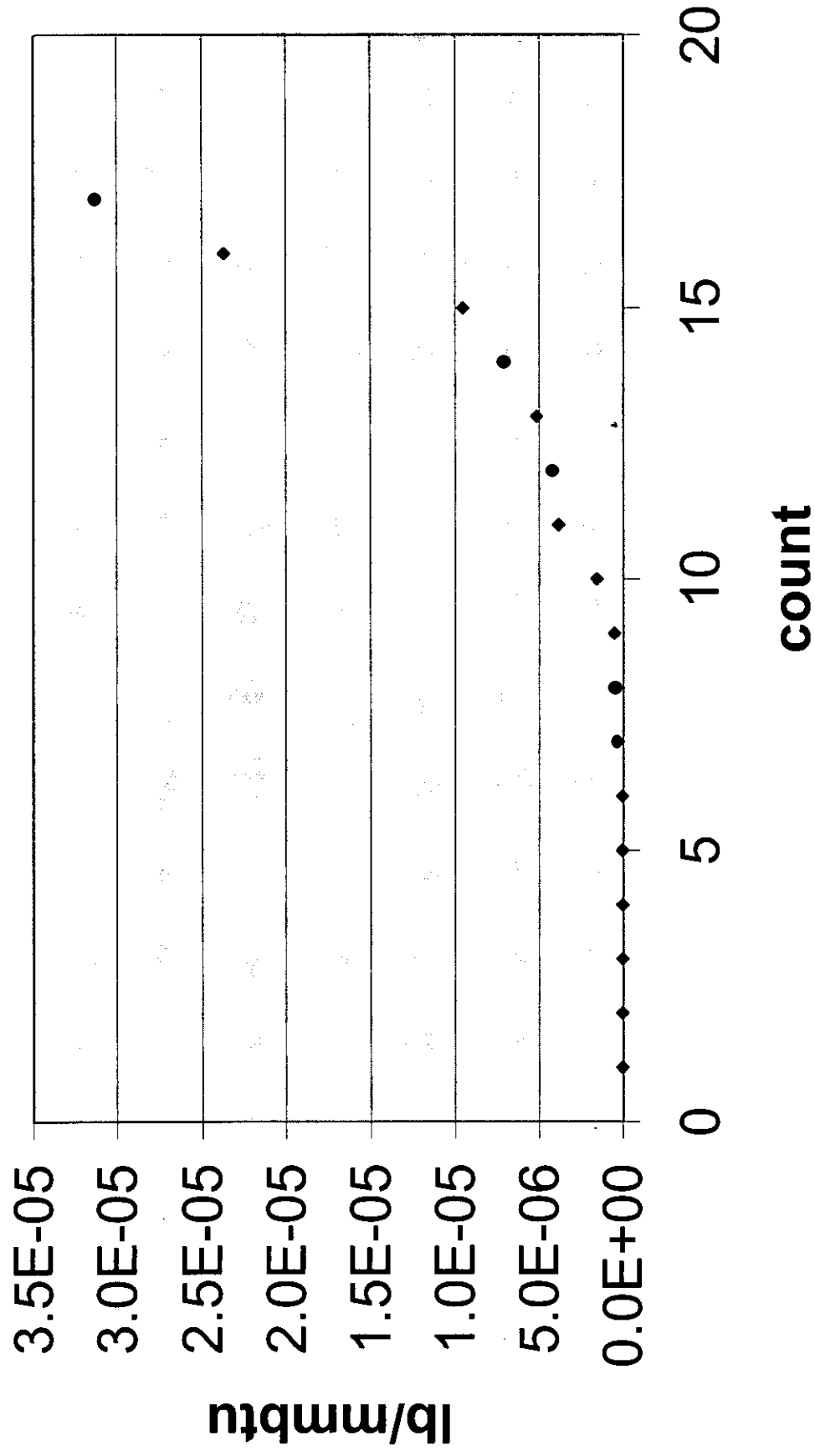
Benzo(b)fluoranthene



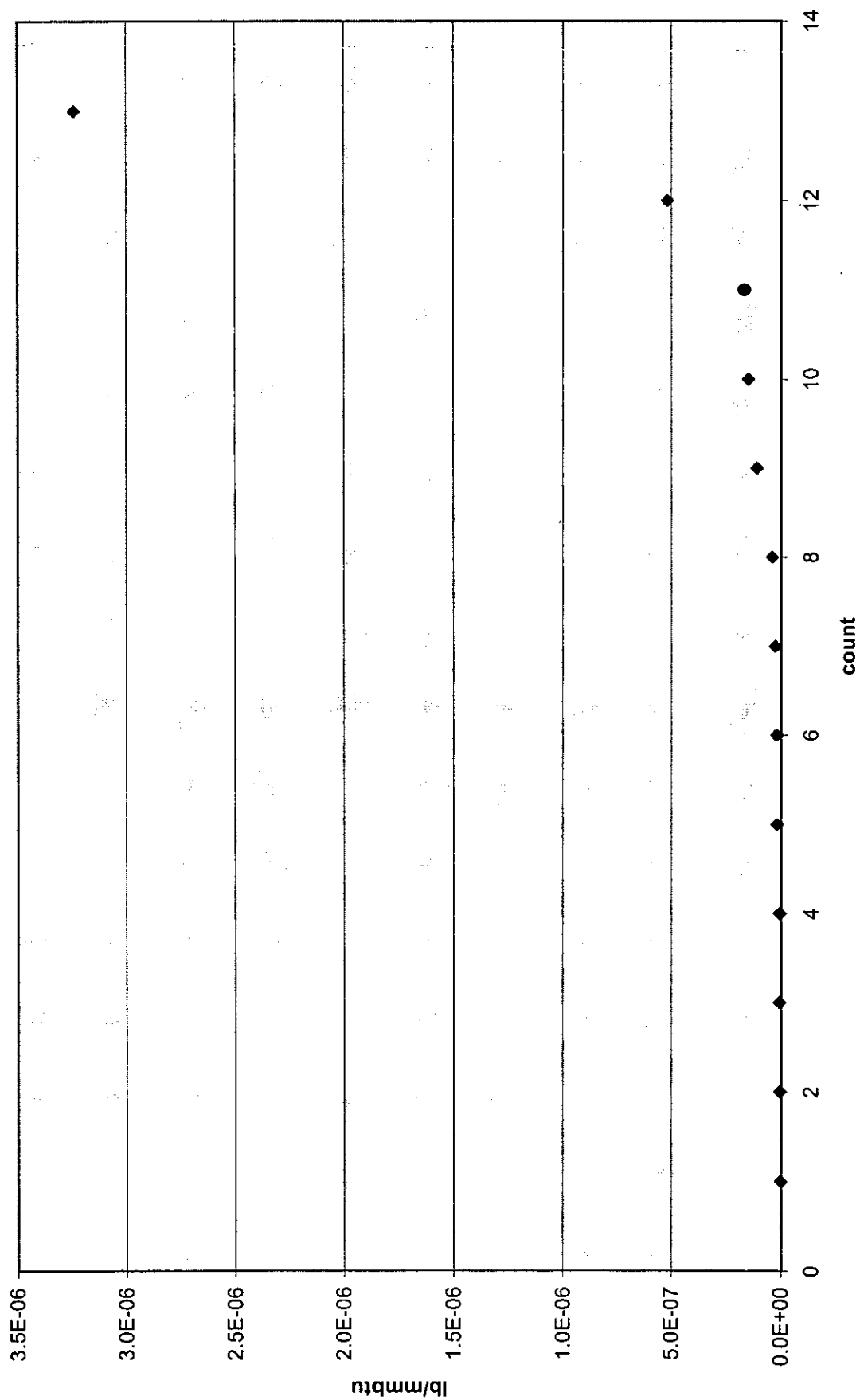
Benzo(g,h,i,l)perylene



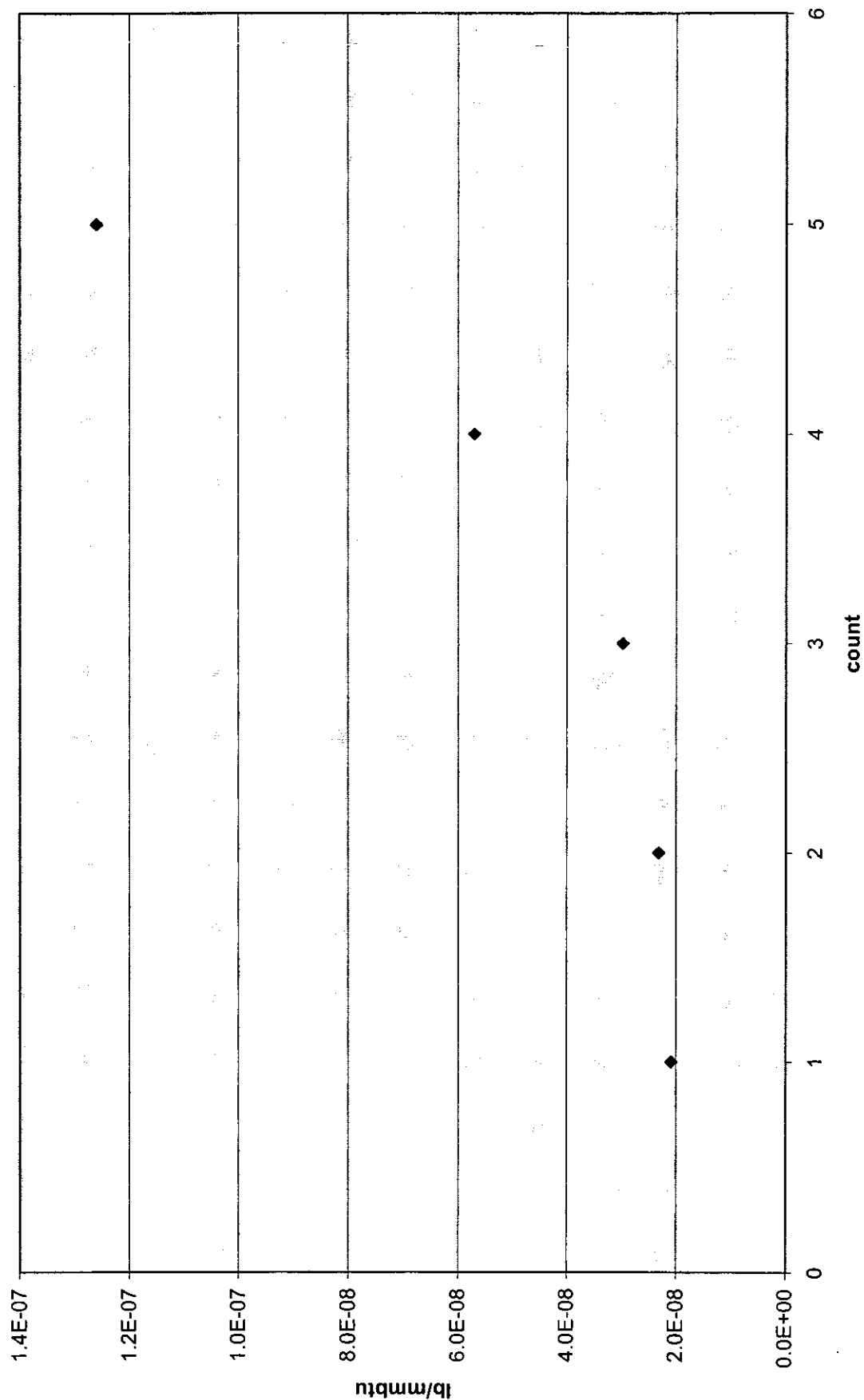
Acenaphthalene



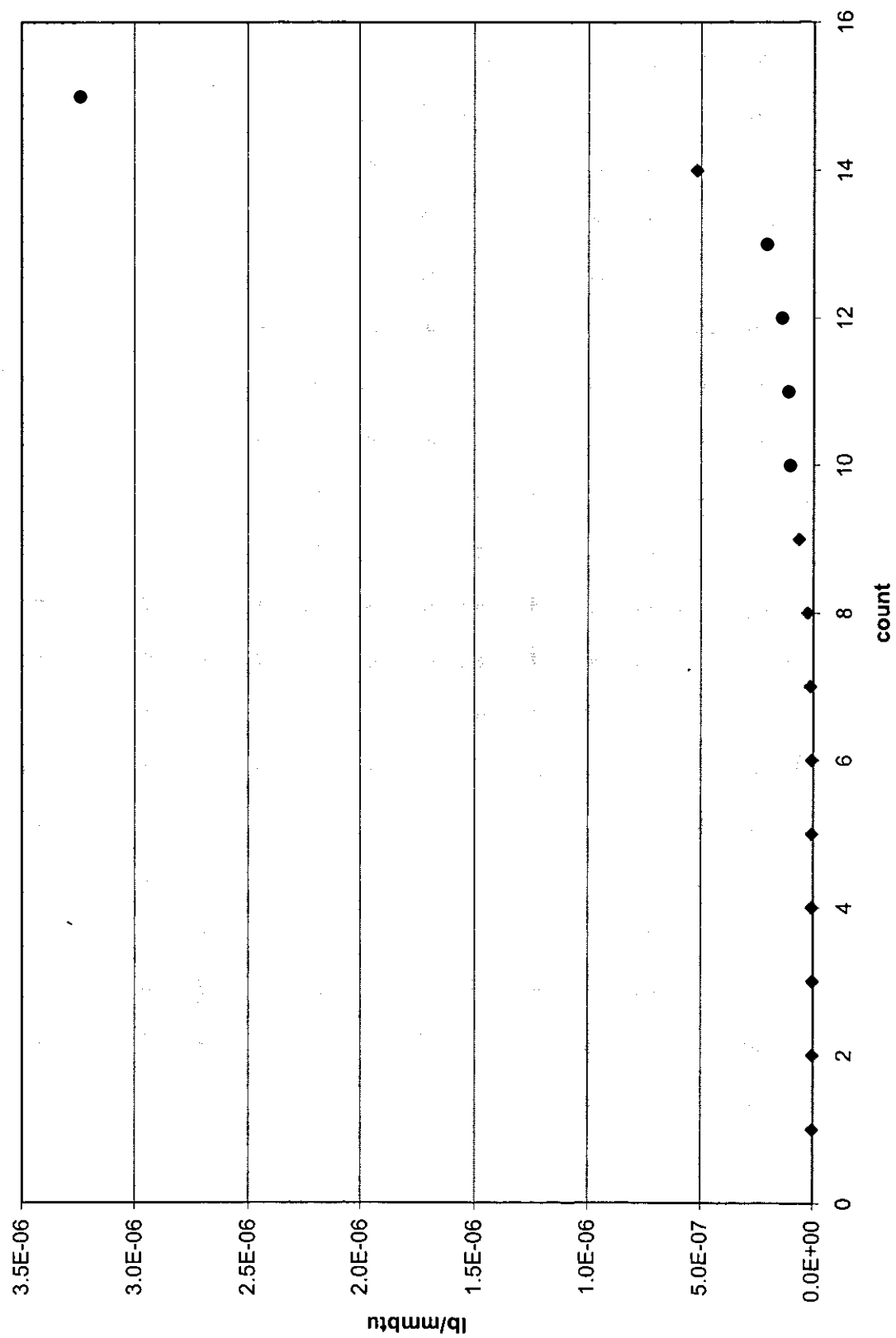
Benzo(k)fluoranthene



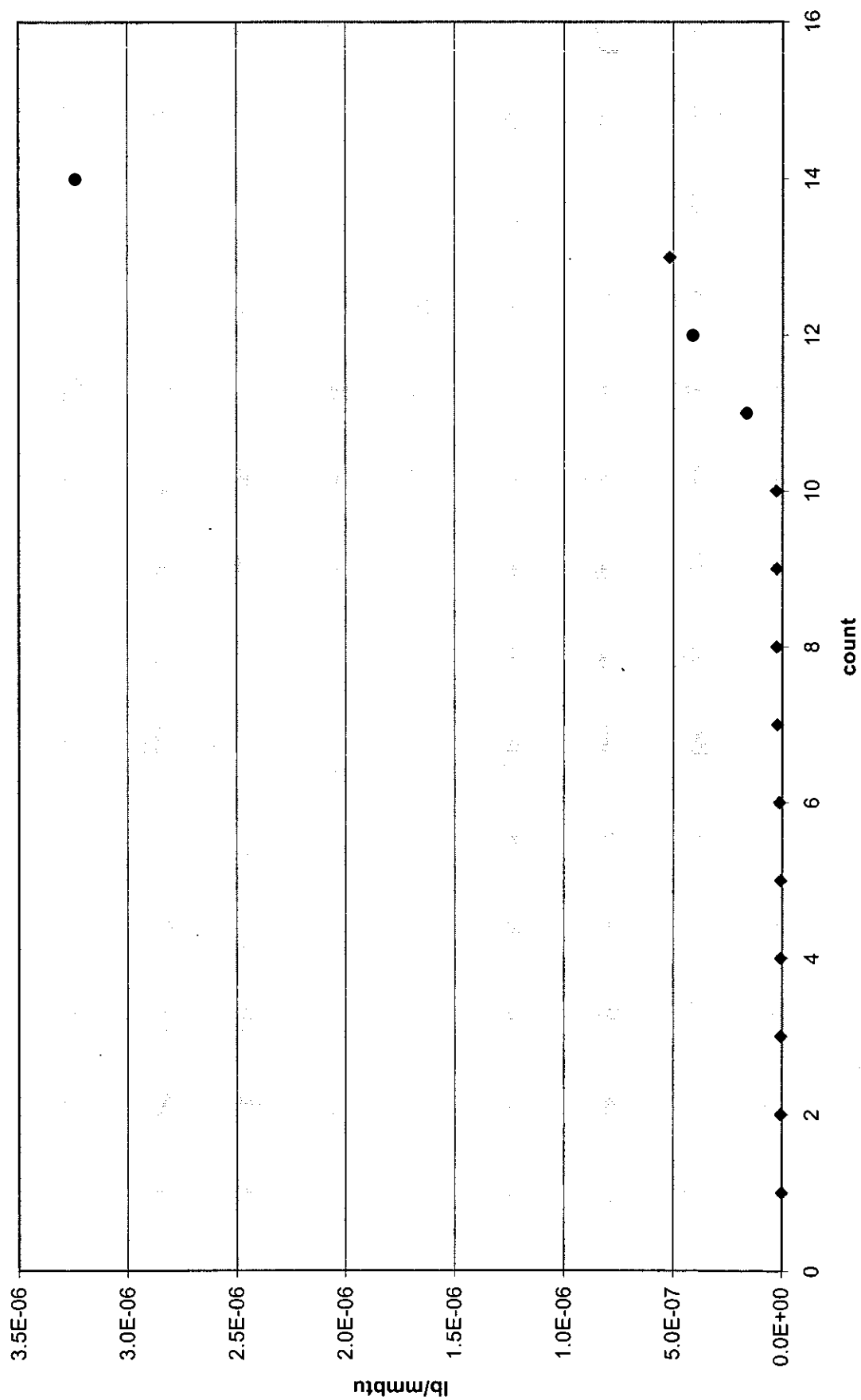
Chlorophenol-2



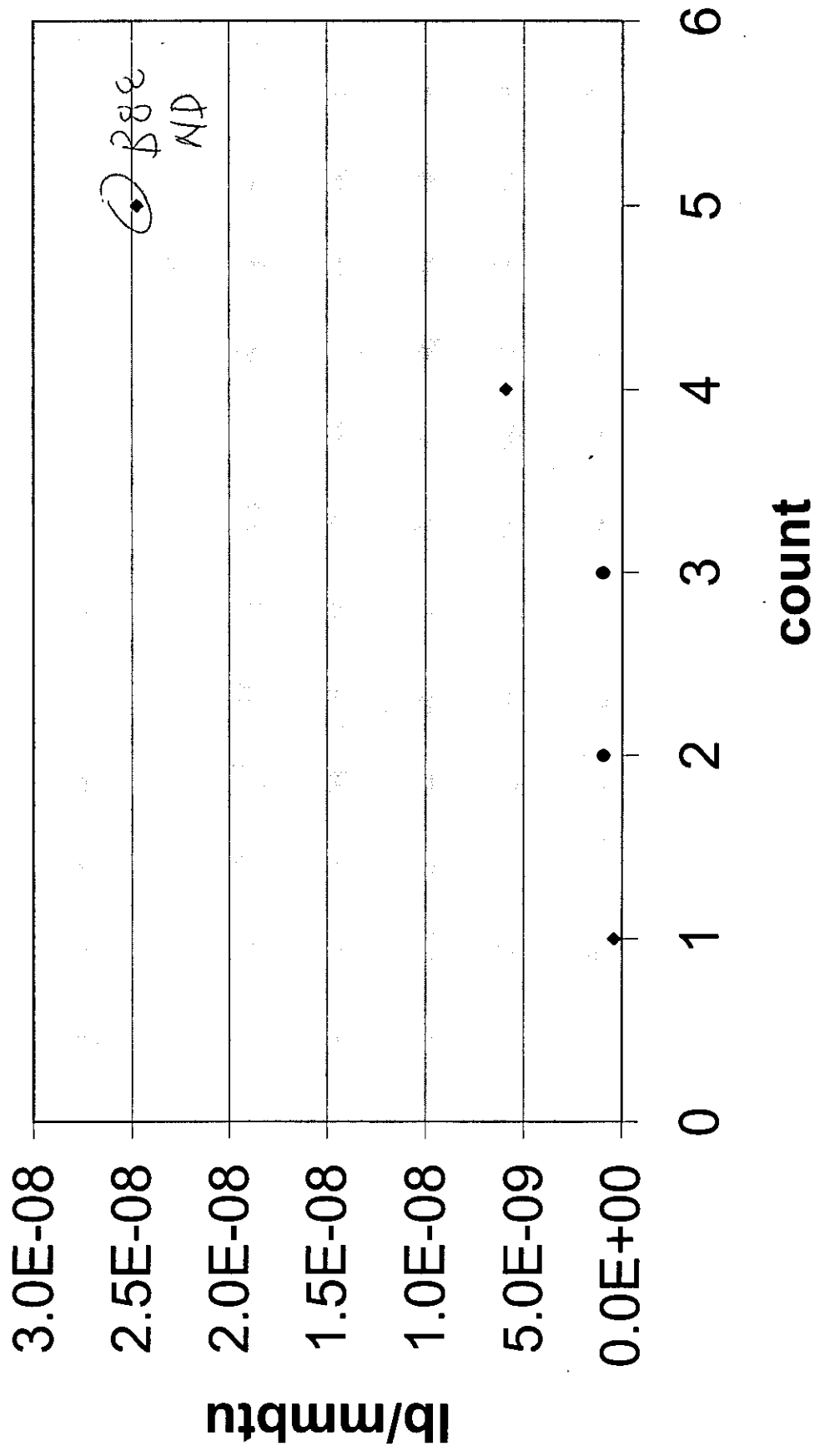
Chrysene



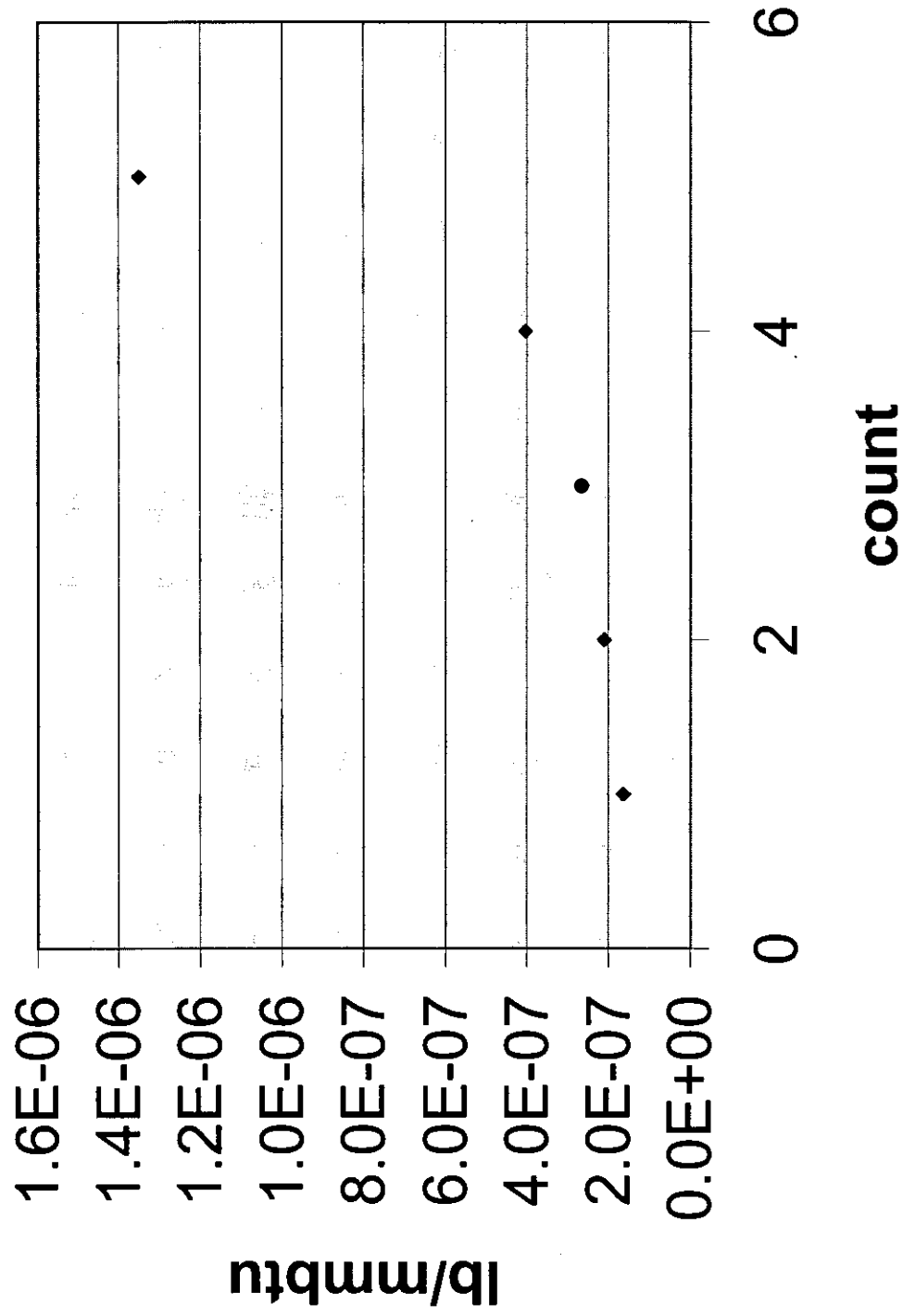
Dibenso(a,h)anthracent



Dichlorobiphenyl

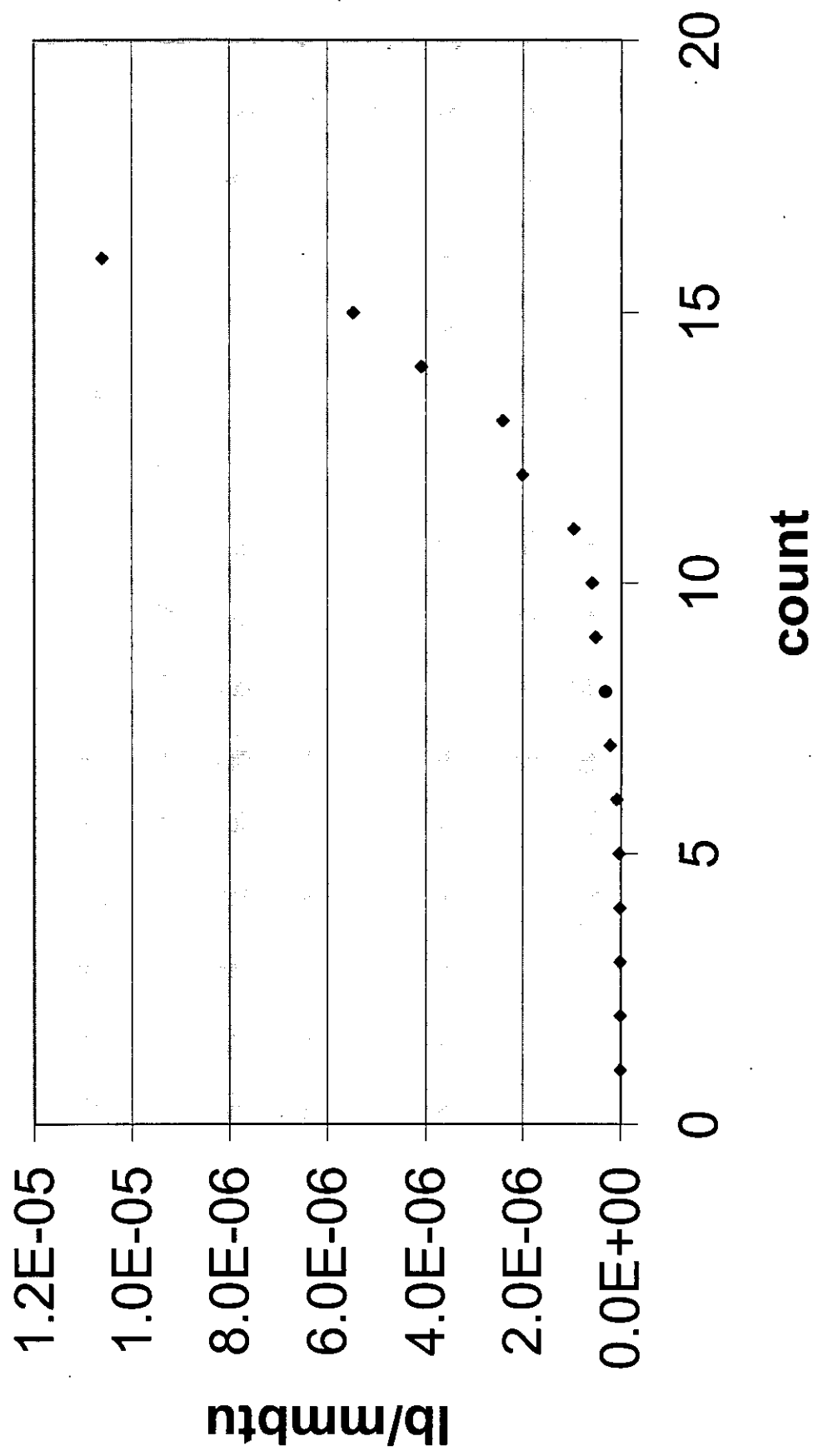


Dinitrophenol-24

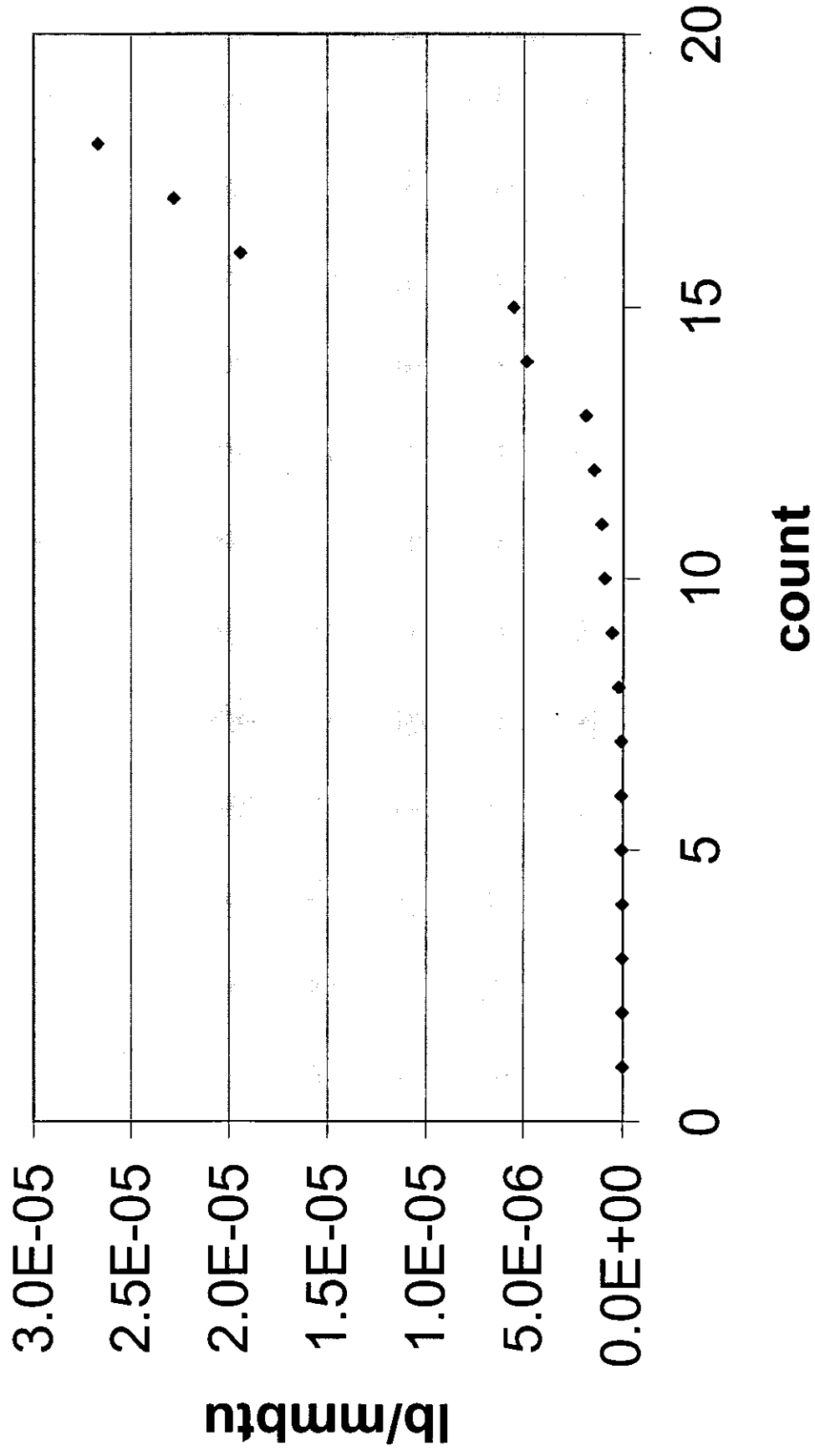


♦ Series1

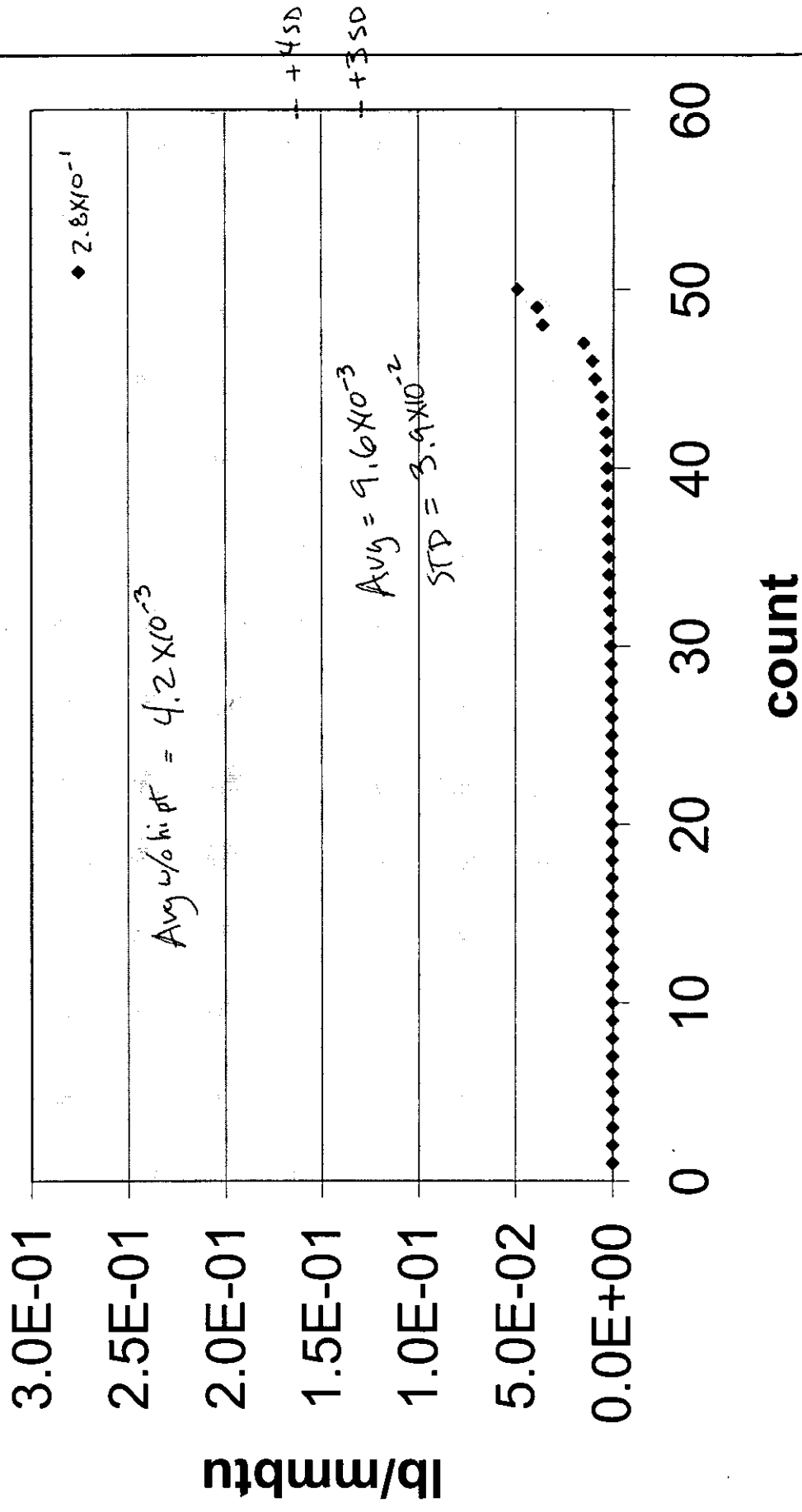
Fluoranthene



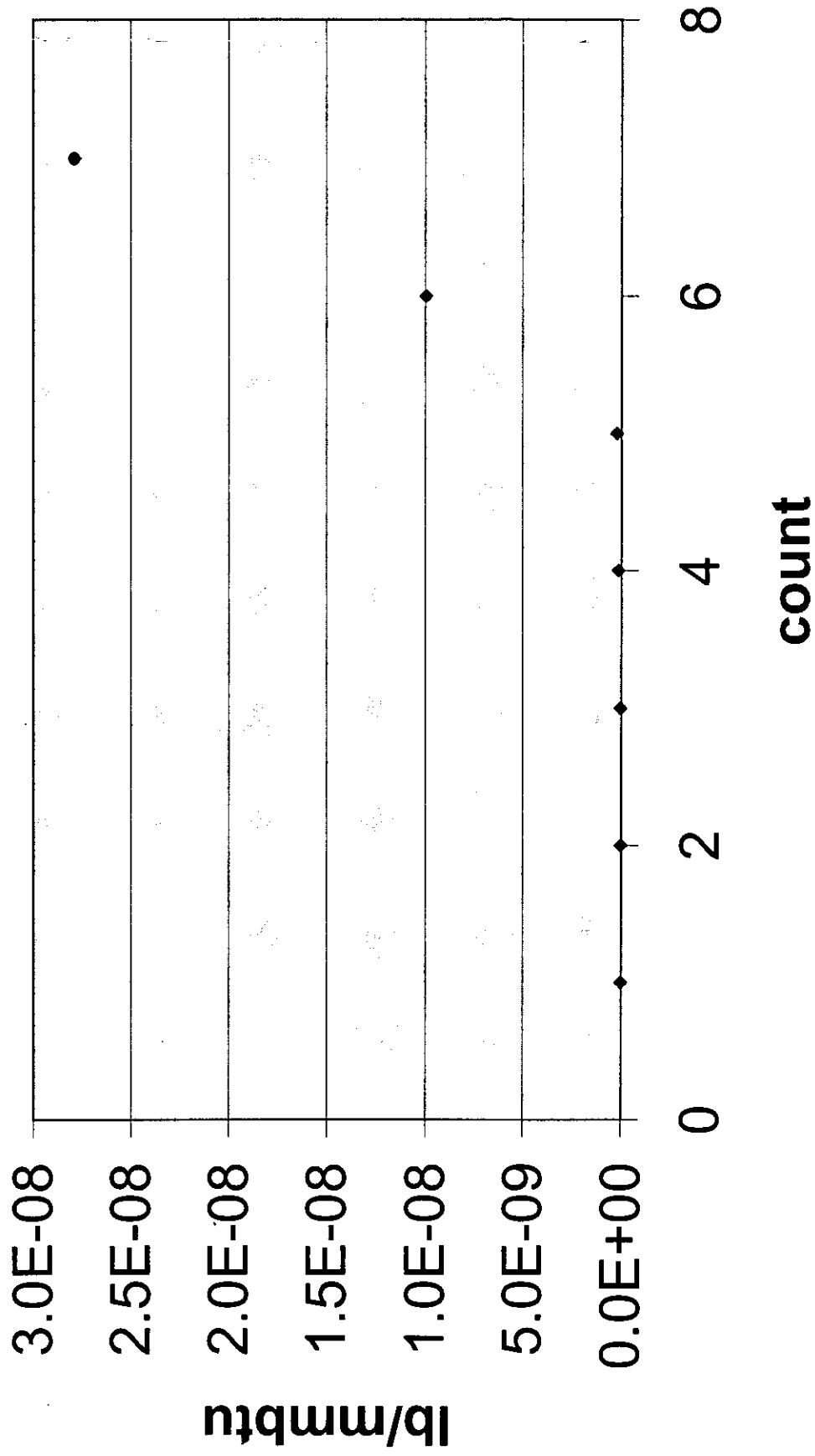
Fluorene



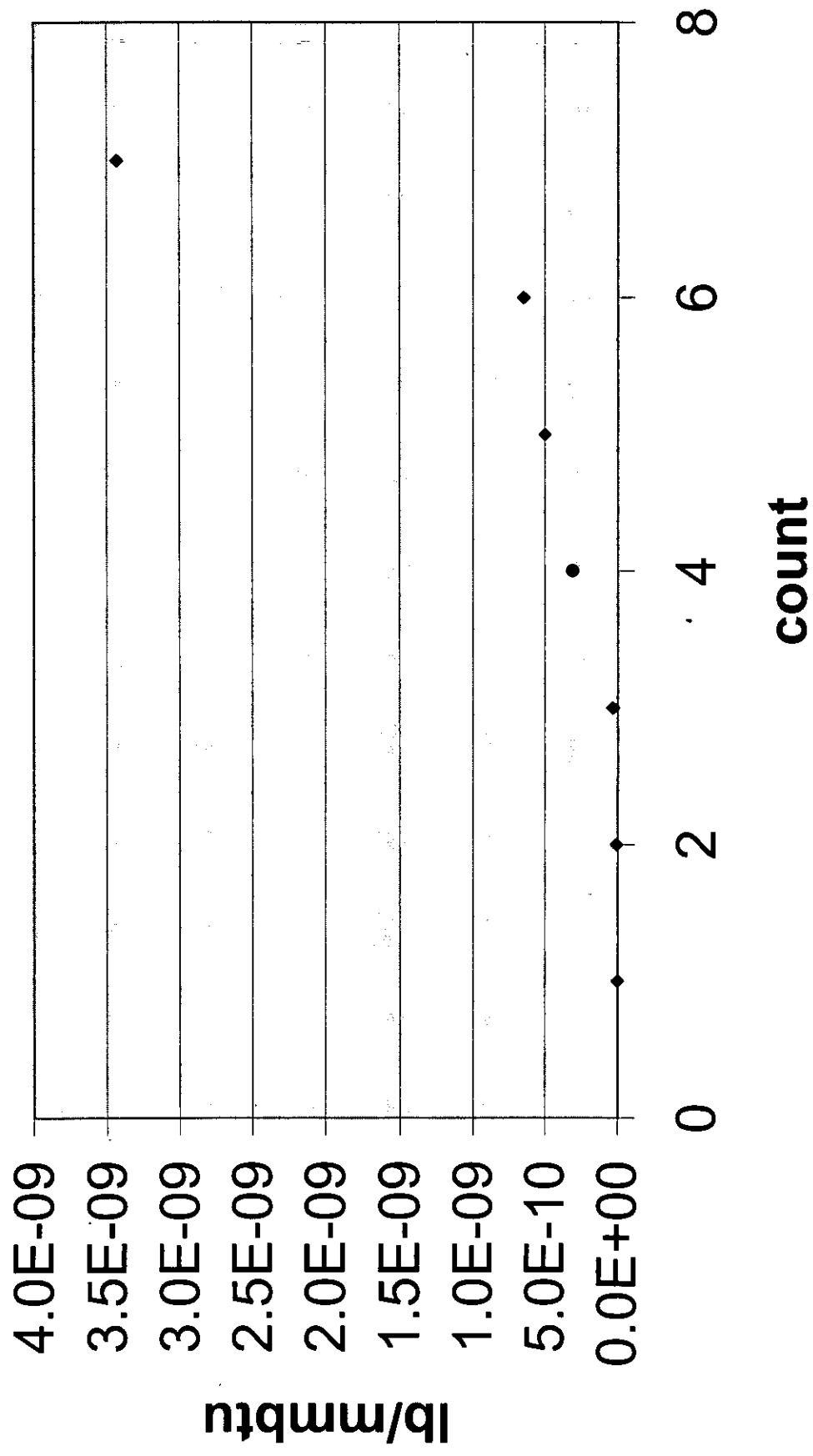
Formaldehyde

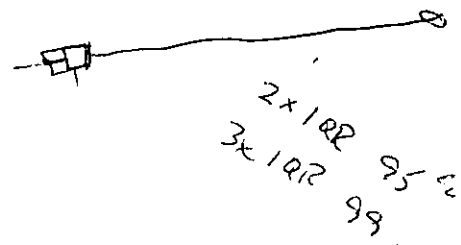
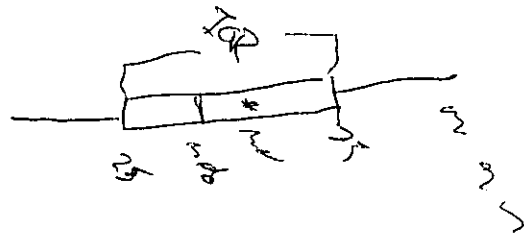


HpCDD-Total

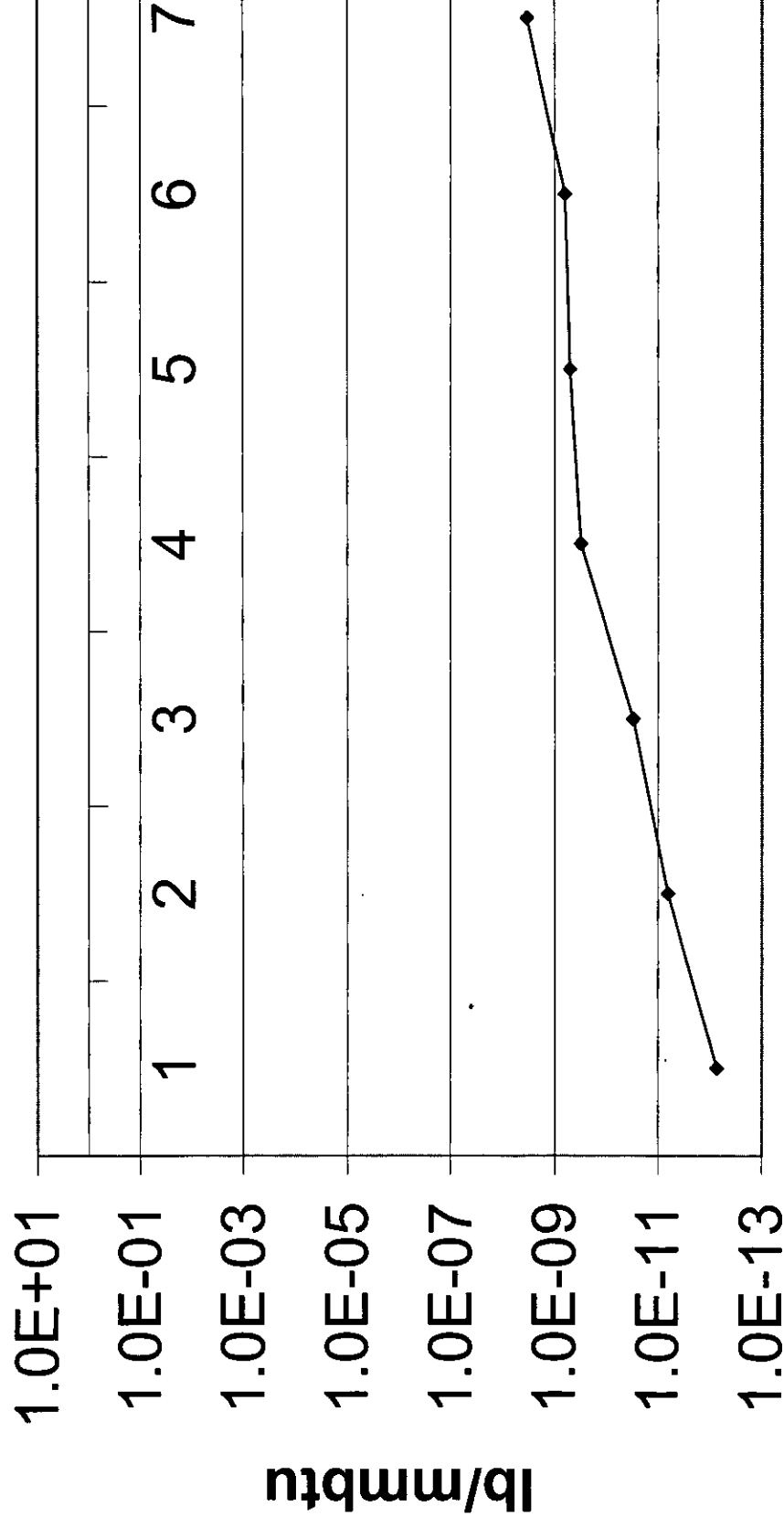


HpCDF-Total



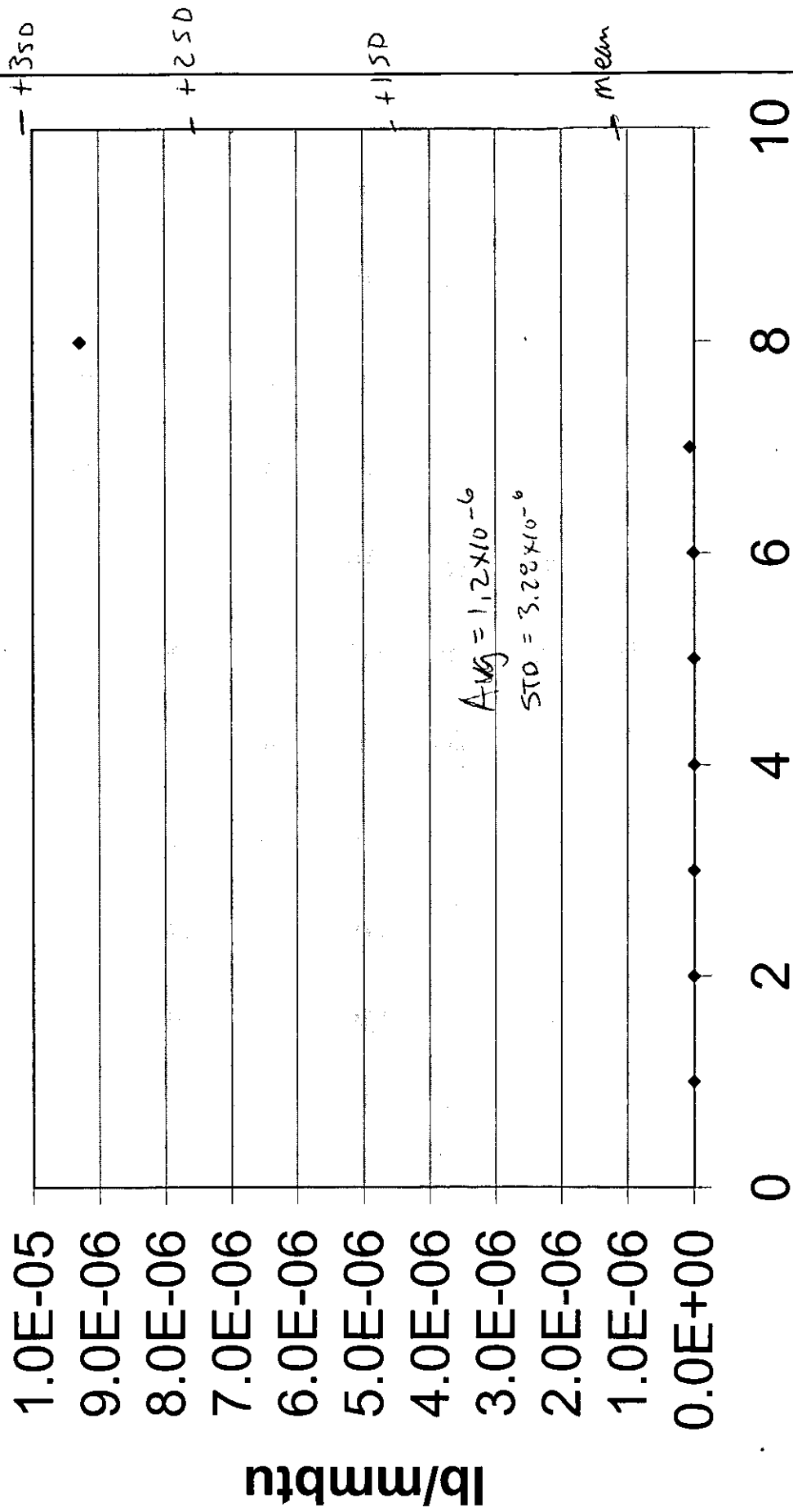


HpCDF-Total

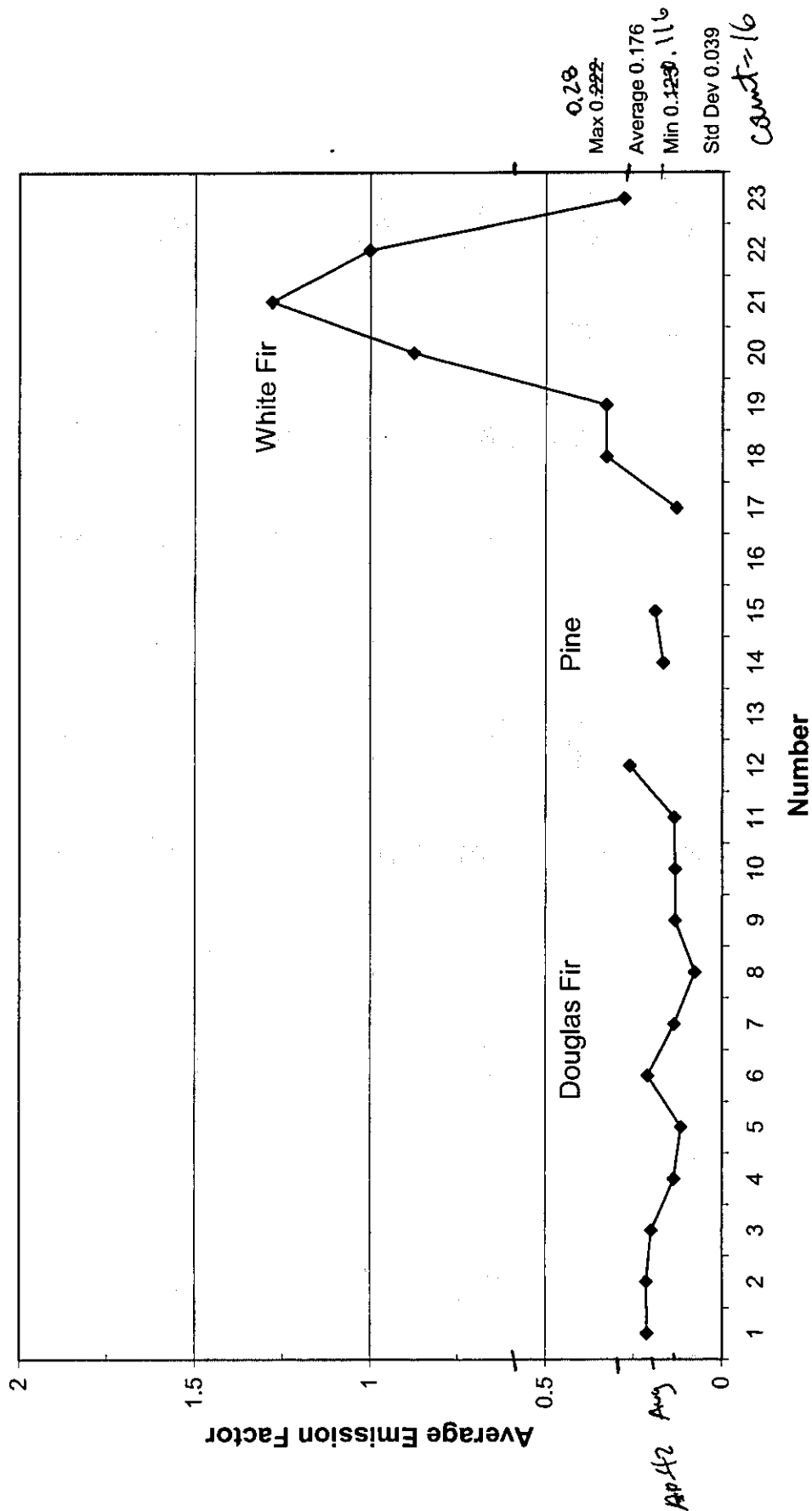


count

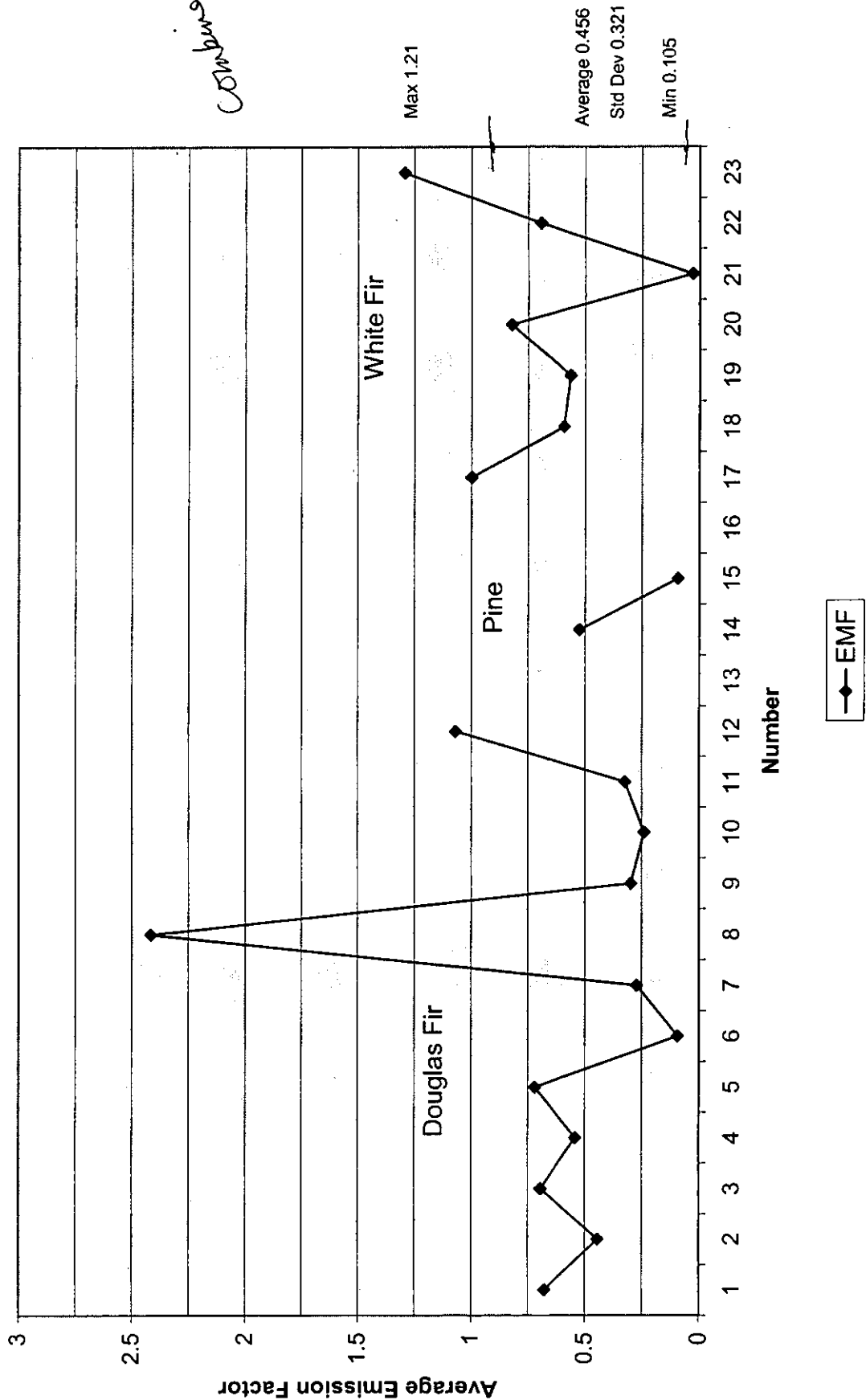
HxCDD-Total



Comparison of NOX Average Emission Factors



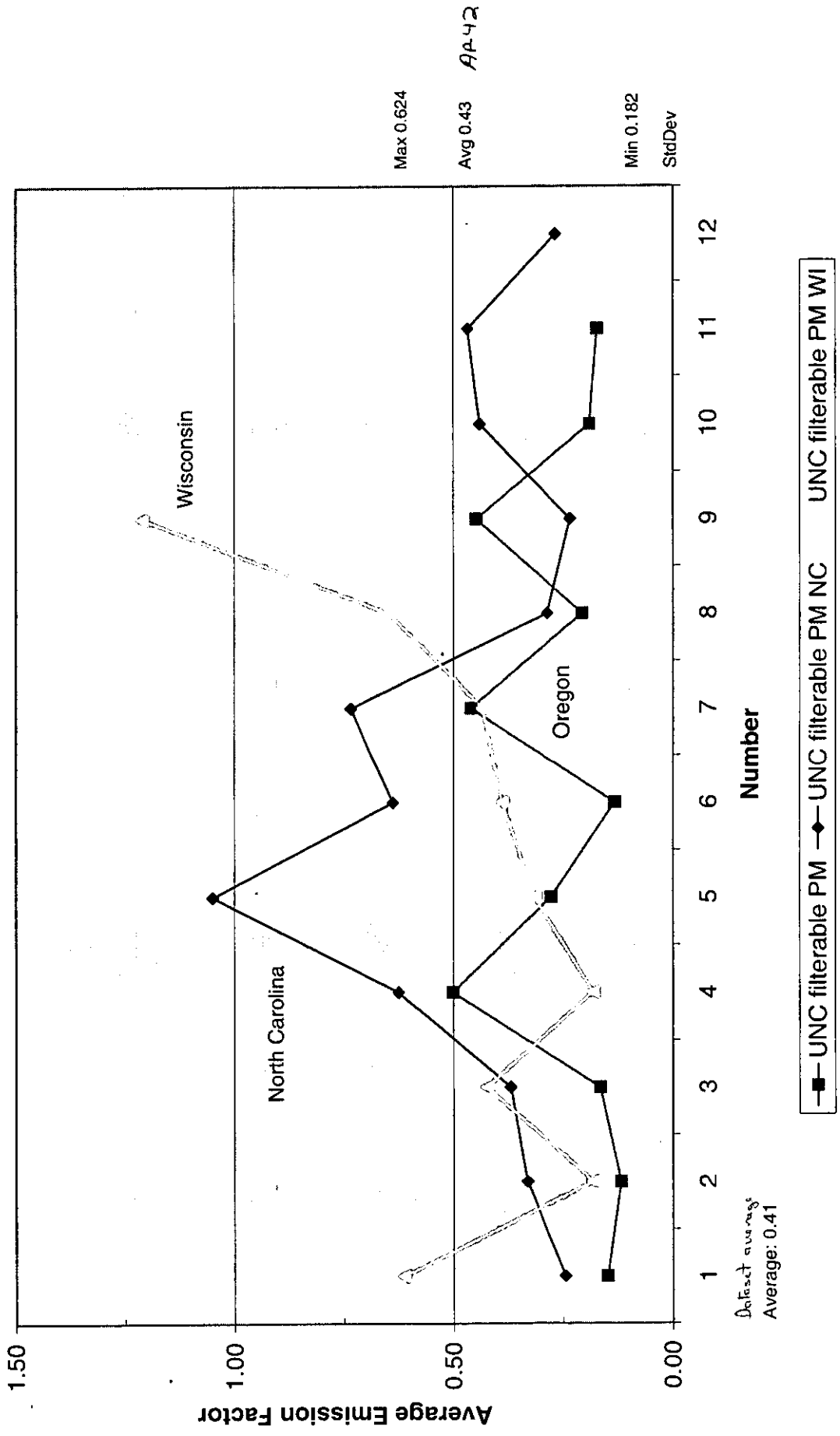
Comparison of CO Average Emission Factors



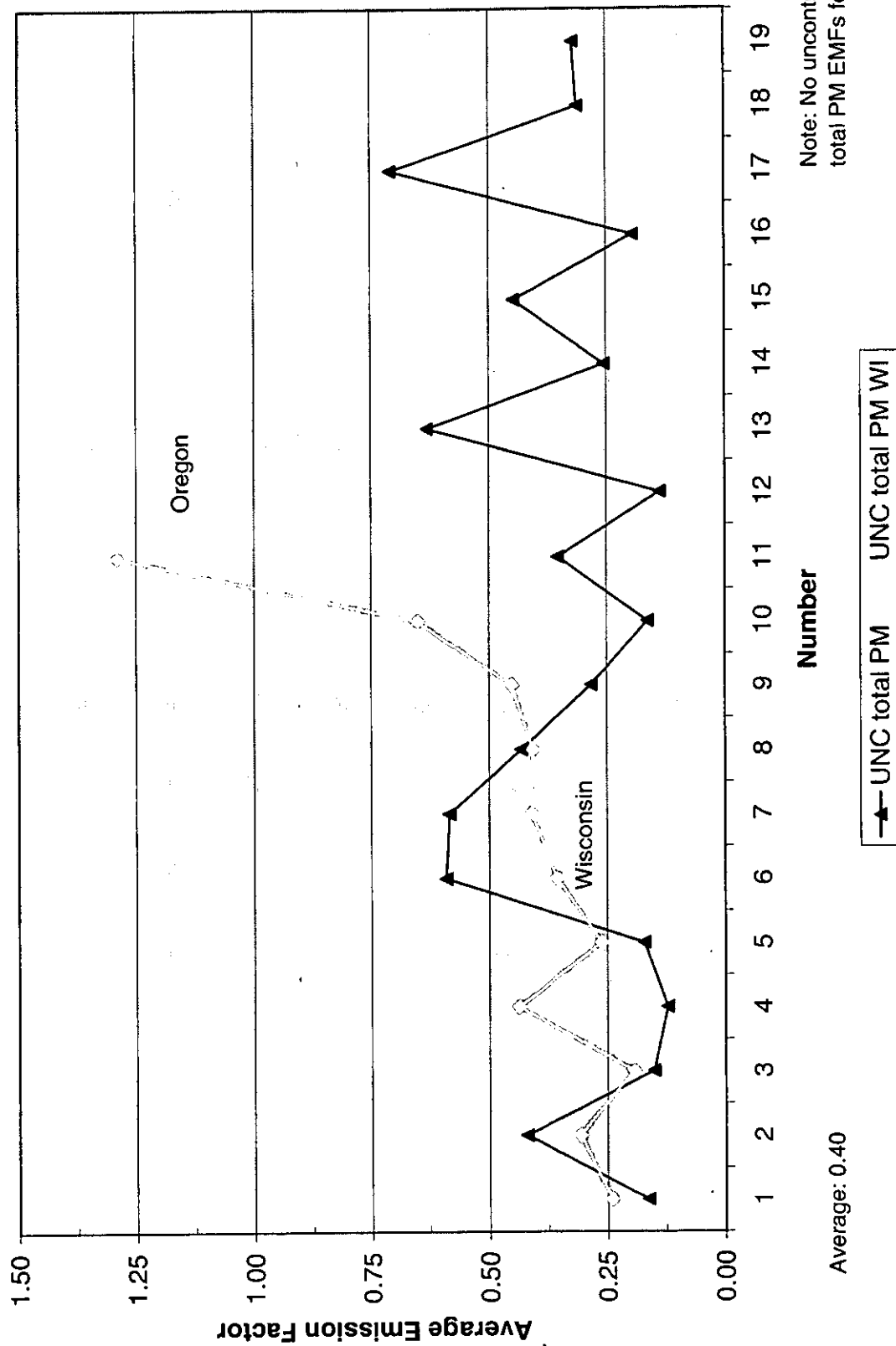
CO Emission Factors for Pure Wood Type

EMF	
1	0.68 Douglas Fir
2	0.44
3	0.70
4	0.54
5	0.72
6	0.09
7	0.27
8	2.42
9	0.30
10	0.24
11	0.32
12	1.07
13	Pine
14	0.53
15	0.09
16	White Fir
17	1.00
18	0.59
19	0.56
20	0.82
21	0.03
22	0.70
23	1.29

Comparison of Uncontrolled filterable PM Average Emission Factors



Comparison of Uncontrolled total PM Average Emission Factors for Oregon and Wisconsin



Emission Factors for Oregon Boilers by Wood Type Where Greater Than Nine Runs Were Performed

EPA Front Half Method

dry wood

Source Category (SCC)	Particulate Matter (filter)		NO _x		SO ₂		VOCs	
	EMF (lb/MMBtu)	EMF (lb/MMBtu)	EMF (lb/MMBtu)	EMF (lb/MMBtu)	EMF (lb/MMBtu)	EMF (lb/MMBtu)	EMF (lb/MMBtu)	EMF (lb/MMBtu)
AP-42 Emission Factors by Pollutant^a (lb/MMBtu)								
[Dutch oven boiler (no SCC)]								
Pine	0.390	0.2	0.024	0.093				
White Fir	0.390	0.2	0.024	0.093				
White Fir & Douglas	0.390	0.2	0.024	0.093				
Fir Mixture	0.390	0.2	0.024	0.093				
Douglas Fir	0.390	0.2	0.024	0.093				
Fir & Hemlock	0.390	0.2	0.024	0.093				
Pine/ Fir	0.390	0.2	0.024	0.093				
Unknown	0.390	0.2	0.024	0.093				
AVERAGE	0.390	0.2	0.024	0.093				
[Spreader/Stoker boiler (no SCC)]								
Pine	0.390	0.2	0.024	0.093				
White Fir	0.390	0.2	0.024	0.093				
White Fir & Douglas	0.390	0.2	0.024	0.093				
Fir Mixture	0.390	0.2	0.024	0.093				
Douglas Fir	0.390	0.2	0.024	0.093				
Fir & Hemlock	0.390	0.2	0.024	0.093				
Pine/ Fir	0.390	0.2	0.024	0.093				
Unknown	0.390	0.2	0.024	0.093				
Mixture of Species	0.390	0.2	0.024	0.093				
AVERAGE	0.390	0.2	0.024	0.093				
[Spreader/Stoker (fixedgrate) boiler]								
Pine	0.390	0.2	0.024	0.093				
White Fir	0.390	0.2	0.024	0.093				
White Fir & Douglas	0.390	0.2	0.024	0.093				
Fir Mixture	0.390	0.2	0.024	0.093				
Douglas Fir	0.390	0.2	0.024	0.093				
Fir & Hemlock	0.390	0.2	0.024	0.093				
Pine/ Fir	0.390	0.2	0.024	0.093				
Unknown	0.390	0.2	0.024	0.093				
Mixture of Species	0.390	0.2	0.024	0.093				
AVERAGE	0.390	0.2	0.024	0.093				
[Stoker boiler]								
Pine	0.390	0.2	0.024	0.093				
White Fir	0.390	0.2	0.024	0.093				
White Fir & Douglas	0.390	0.2	0.024	0.093				
Fir Mixture	0.390	0.2	0.024	0.093				
Douglas Fir	0.390	0.2	0.024	0.093				
Fir & Hemlock	0.390	0.2	0.024	0.093				
Pine/ Fir	0.390	0.2	0.024	0.093				
Unknown	0.390	0.2	0.024	0.093				
Mixture of Species	0.390	0.2	0.024	0.093				
AVERAGE	0.390	0.2	0.024	0.093				
[Suspension burner boiler]								
Pine	0.390	0.2	0.024	0.093				
White Fir	0.390	0.2	0.024	0.093				
White Fir & Douglas	0.390	0.2	0.024	0.093				
Fir Mixture	0.390	0.2	0.024	0.093				
Douglas Fir	0.390	0.2	0.024	0.093				
Fir & Hemlock	0.390	0.2	0.024	0.093				
Pine/ Fir	0.390	0.2	0.024	0.093				
Unknown	0.390	0.2	0.024	0.093				
Mixture of Species	0.390	0.2	0.024	0.093				
AVERAGE	0.390	0.2	0.024	0.093				
Pine	0.390	0.2	0.024	0.093				
White Fir	0.390	0.2	0.024	0.093				
White Fir & Douglas	0.390	0.2	0.024	0.093				

Emission Factors for Oregon Boilers by Wood Type Where Greater Than Nine Runs Were Performed

EPA Front Half Method

Source Category (SCC)	Particulate Matter (filter)		NO _x		SO ₂		VOCs	
	EMF (lb/MMBtu)		EMF (lb/MMBtu)		EMF (lb/MMBtu)		EMF (lb/MMBtu)	
AP-42 Emission Factors by Pollutant* (lb/MMBtu)	0.390		0.2		0.024		0.093	
Unknown wood species mix 60% sander dust and 40% hogged fuel by volume								
Mixture of Species								
AVERAGE			1.5307				0.0641	
Fuel cell boiler								
Pine								
White Fir								
White Fir & Douglas								
Fir Mixture								
Douglas Fir								
Fir & Hemlock								
Pine/ Fir								
Unknown								
Mixture of Species								
AVERAGE			0.2734				0.0096	
			0.2734				0.0096	

[a-AP-42 Emission Factors were taken from Section 1.6 of AP-42, Tables 1.6-1, 1.6-2 and 1.6-3 for Wet Wood, No Controls

NOX Average Emission Factors

EMF	
1	0.21111177 Douglas Fir
2	0.2131027
3	0.1988705
4	0.1358034
5	0.1157678
6	0.2096877
7	0.13534
8	0.0762046
9	0.1327782
10	0.132907
11	0.1347592
12	0.2609278
13	Pine
14	0.1669823
15	0.1884628
16	White Fir
17	0.1295377
18	0.3265781
19	0.3280144
20	0.8750436
21	1.2805173
22	1.0014459
23	0.2787058

18
'604 = Avg

COMPARISON OF EMISSION FACTORS FROM WOOD WASTE COMBUSTION

EMISSION FACTORS FROM WOOD WASTE BOILERS

Published AP-42 Factor				Draft AP-42 Emission Factor				Final AP-42 Emission Factor			
		PUBLISHED EMISSION FACTOR (lb/ton)	EMISSION FACTOR RATING	EQUIVALENT FACTOR (lb/MMBtu)	CATEGORY	DRAFT EMISSION FACTOR (lb/MMBtu)	EMISSION FACTOR RATING	NEW EMISSION FACTOR (lb/MMBtu)	COUNT	STANDARD DEVIATION	EMISSION FACTOR RATING
CO	Fuel cell/Dutch Oven	6.60	C	0.73	Bark	0.72	D	0.72	3	0.60	C
	Stoker	13.60	C	1.51	Bark/Wet Wood	0.68	B	0.66	17	0.40	A
	FBC	1.40	D	0.16	Wet Wood	0.61 50	B	0.58	94	0.52	A
					Dry Wood	0.61 61	A	0.57	14	0.62	B
NOX	Fuel cell/Dutch Oven	0.38	C	0.042	Bark	0.20	B	0.22	82	0.18	A
	Stoker	1.50	C	0.167	Bark/Wet Wood	0.20	B	0.22	82	0.18	A
	FBC	2.00	D	0.222	Wet Wood	0.20	C	0.22	82	0.18	A
					Dry Wood	0.45	B	0.49	8	0.25	C
SO2	Fuel cell/Dutch Oven	0.075	B	0.00825	Bark	0.024	B	0.025	28	0.037	A
	Stoker	0.075	B	0.00825	Bark/Wet Wood	0.024	B	0.025	28	0.037	A
	FBC	0.075	B	0.00825	Wet Wood	0.024	B	0.025	28	0.037	A
					Dry Wood	0.024	B	0.025	28	0.037	A

all fuels
all ~~bark~~ firing
configuration