

St. Neots VOC Emissions Inventory for JANUARY- DECEMBER 2001

Input Data Sheet

Period for Calculation

Start Date: Jan-01
End Date: Dec-01

Solvent Receipts

	<u>Mtl.</u>	<u>Kg. Received</u>	<u>Excel Var.</u>
ST 1	PENTO	134,563	tank1
ST 2	SQUO	1,321,300	tank2
ST 3	SQUO	1,321,300	tank3
ST 4	ACET	16,220	tank4
ST 6	IPA	10,660	tank6
ST 7	SOX	6,040	tank7

Solvent Used in SLC Production

	<u>Mtl.</u>	<u>Kg. Used</u>	<u>Excel Var.</u>
	ACET	21,076	acet
	IPA	11,434	ipa
	PENTO	128,756	pento
	SOX	5,499	sox
	SQUO	2,624,550	squo

Solvent Production

	<u>Kg. Produced</u>	<u>Excel Var.</u>
All SLC	5,011,935	slc

SLC Packaging

	<u>Kg. Produced</u>	<u>Excel Var.</u>
Bulk	792,440	bulk
IBCs	391,214	ibc
Drums	3,787,228	drum
All Other	41,053	other

Results of Annual VBS Monitoring

	<u>Monitored E%</u>	<u>Excel Var.</u>
Mixer solvent loading	100%	mixer_e
BT SF loading	100%	btsf_e
BT homogenization	100%	bthomo_e

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[illegible]

Mixer Emissions Calculations

August
1999

Using methods based on:

Emission Inventory Improvement Program
Preferred and Alternative Methods for Estimating Air
Emissions from Paint and Ink Manufacturing Facilities
USEPA

4.1.1 Material Loading (loading of Solids only)

[equation 8.4-1] $E(\text{VOC}) = 12.46 \cdot S \cdot P \cdot M \cdot Q / T$

variable	value	units	comment
E(VOC)	2750.87797	lb	
S	1	dim/less	assume S = 1 (overestimate)
P	2.00	psia	VP hexane at T=55 F
M	86.00	lb/lb-mol	
Q	861.05	1000 gal	throughput for all mixers x 40%
T	515	T(R)	=T(F) + 460

4.1.2 Heat-up Losses

[equation 8.4-10] $E(\text{VOC}) = \frac{(TVP, T1 / (14.7 - TVP, T1)) + (TVP, T2 / (14.7 - TVP, T2)) \cdot dn \cdot Ma \cdot CYC}{2}$

variable	value	units	comment
E(VOC)	11129.0833	lb	
TVP, T1	2	psia	VP at initial batch temp
TVP, T2	11.7	psia	VP at final batch temp
dn	0.04899102	lb-mol/cycle	calc'd by equation 8.4-11, below
Ma	86	lb/lb-mol	molecular weight
CYC	1354.57703	cycles	batches per period = tput/3700 (avg capacity)

	T	VP
T1	55	2
T2	140	11.7

	BS
SSW	2400 Kg
LSW	4800
MM	4800
ACET SW	2800
"Avg"	14600

[equation 8.4-11] $dn = (V / R) \cdot ((Pa1 / T1) - (Pa2 / T2))$

variable	value	units	comment
dn	0.04899102	lb-mol/cycle	
V	25.7379679	R ³	mixer nominal - working capacity = 200 gal
R	10.73	psia * R ³ /lb-mol	ideal gas constant
Pa1	12.7	psia	14.7 - TVP, T1 (from above)
Pa2	3	psia	14.7 - TVP, T2 (from above)
T1	515	T(R)	T1 = 55 F
T2	600	T(R)	T2 = 140 F

4.1.4 Surface Evaporation

[equation 8.4-18] $Ex = Mx \cdot Kx \cdot A \cdot Px \cdot 3600 \cdot H \cdot B / R \cdot T$

variable	value	units	comment
Ex	1891.79332	lb	calculate for all species based on tvp and amw
Mx	86	lb/lb-mol	average molecular weight
Kx	0.00446549	R/sec	calc'd below from equation 8.4-17
A	1.39555566		based on 18" ID mixer hatch
Px	2		calc'd at Tavg
H	2	hr/batch	open vessel batch time = 2 hrs/batch
B	1354.57703		batches per period
R	10.73	psia * R ³ /lb-mol	
T	515		use T1

[equation 8.4-17] $Kx = 0.00438 \cdot U^{0.78} \cdot (18/Mx)^{0.333}$

variable	value	units	comment
Kx	0.00446549	R/sec	
U	2	mile/hr	assume wind speed in closed vessel is 2 mph
Mx	86	lb/lb-mol	average molecular weight

St. Neots VOC Emissions Inventory

Material Properties

Bulk Solvents at Storage Conditions – 13 C (55 F)

Temp. Conversion

Matl.	Annual Avg. Storage Temperature, F	Avg. Diurnal Temperature Change, F	TVP, psia	Avg. MW, lbs/lb-mol	Note
SQUO	55	0	2	82.4	
ACET	55	0	2.9	58	
PENTO	55	13.5	0.5	100	

	C	F
Bulk Storage	13	55
Packaging	20	68
B/T Breathing	22	72
Homog Pass	50	122
B/T Loading	60	140
initial bp, SQUO	55	131

SLC Products at B/T Loading (SF Reception) Conditions -- 60 C (140 F)

Matl.	Annual Avg. Storage Temperature, F	Avg. Diurnal Temperature Change, F	TVP, psia	Avg. MW, lbs/lb-mol	Note
100A	140	na	11.7	83.8	100% SQUO
9291	140	na	11.7	83.8	100% SQUO
235	140	na	8.1	91.9	50:50 SQUO:PENTO
239	na	na	na	na	100% ACET

SLC Products at B/T Homog Pass Conditions – 50 C (122 F)

Matl.	Annual Avg. Storage Temperature, F	Avg. Diurnal Temperature Change, F	TVP, psia	Avg. MW, lbs/lb-mol	Note
100A	122	na	8.4	83.6	100% SQUO
9291	122	na	8.4	83.6	100% SQUO
235	122	na	5.7	91.8	50:50 SQUO:PENTO
239	na	na	na	na	100% ACET

SLC Products at B/T Breathing Conditions – 22 C (72 F)

Matl.	Annual Avg. Storage Temperature, F	Avg. Diurnal Temperature Change, F	TVP, psia	Avg. MW, lbs/lb-mol	Note
100A	72	6	2.9	82.7	100% SQUO
9291	72	6	2.9	82.7	100% SQUO
235	72	6	1.9	91.4	50:50 SQUO:PENTO
239	na	na	na	na	100% ACET

SLC Products at Packaging Conditions -- 20 C (68 F)

Matl.	Annual Avg. Storage Temperature, F	Avg. Diurnal Temperature Change, F	TVP, psia	Avg. MW, lbs/lb-mol	Note
100A	68	na	2.7	82.7	100% SQUO
9291	68	na	2.7	82.7	100% SQUO
235	68	na	1.7	91.4	50:50 SQUO:PENTO
239	68	na	na	na	100% ACET

VBS Efficiency Monitoring Log Sheet

Date(s) of Test: 2-8-07

Method of Test: FID Detector

Person Conducting Test: G. Dreier - A. Bechler

Leak Detection Threshold = 500 ppm

Activity	Batch Specific Data	Monitoring Duration	Max ppm	MR	E%
Pumping solvent from storage tank to solvent mixer	Product: SOLVENT Mixer: MASTERMIX Conservation Vent #:	Minimum: 15 minutes Actual Time on/off: 11:30 am	42-4	0.7	100
Pumping compound from mixer to bulk tank	Product: 100A "From" BT: LARGE STEEL TANK "To" BT: BT 5 Conservation Vent #: 26	Minimum: 1 hr Actual Time on/off: 10:30 am	116	21.6	10
Pumping from bulk tank to bulk tank (positive pass homogenisation)	Product: 100A "From" BT: 1 "To" BT: 3 Conservation Vent #: 8	Minimum: 1 hr Actual Time on/off: 12:00 noon	2.5	0.04	100

Additional Comments:

August 2nd 2001

Vent Monitorings

Expt 1			Solvent into mixer			Homogenising bulk tank1 to 3		
Mixer (Large Struthers to BT5)			11.30 am			12.00 am		
Time	Reading		Time	Reading		Time	Reading	
secs	ppm		secs	ppm		secs	ppm	
15	16.3		15	0		15	0	
30	0		30	0		30	0	
45	25.7		45	0		45	0	
60	0		60	0		60	0	
75	0		75	0		75	0	
90	0		90	0		90	0	
105	0		105	0		105	0	
120	0		120	0		120	0	
135	0		135	0		135	0	
150	0		150	0		150	0	
165	0		165	0		165	0	
180	21.7		180	0		180	0	
195	27.9		195	0		195	0	
210	54.7		210	0		210	0	
225	15.9		225	0		225	0	
240	35.5		240	0		240	0	
255	22.7		255	0		255	0	
270	0		270	0		270	0	
285	47.1		285	0		285	0	
300	0		300	0		300	0	
315	54.7		315	0		315	0	
330	26.8		330	0		330	0	
345	6.7		345	0		345	0	
360	0		360	0		360	0	
375	0		375	0		375	0	
390	0		390	0		390	0	
405	0		405	0		405	0	
420	0		420	0		420	0	
435	30.9		435	0		435	0	
450	109.6		450	0		450	0	
465	82.7		465	0		465	0	
480	80.3		480	0		480	0	
495	87		495	0		495	0	
510	116.2		510	0		510	0	
525	114		525	0.7		525	0	
540	109		540	5.4		540	0	
555	29.4		555	0		555	0	
570	0		570	2.4		570	0	
585	0		585	0		585	0	
600	55.7		600	0		600	0	
615	3.4		615	10.5		615	0	
630	0		630	0		630	0	
645	0		645	7.2		645	0	
660	0		660	0		660	0	
675	0		675	0		675	0	
690	0		690	0		690	0	
705	0		705	0		705	0	
720	0		720	0		720	0	
735	17		735	0		735	0	
750	0		750	0		750	0	
765	0		765	0		765	0	
780	0		780	0		780	0	
795	0		795	8.9		795	0	
810	3.2		810	0		810	0	
825	0		825	0		825	0	
840	43.7		840	0		840	0	
855	0		855	9.3		855	0	
870	0		870	0		870	0	
885	79		885	0		885	0	
900	0		900	0		900	0	
915	0		915	0		915	2.5	
81	1316.8		81	42.4		81	2.5	
mean	21.6	ppm	mean	0.7	ppm	mean	0.04	ppm
flow rate	1.3	m/sec	flow rate	1.3	m/sec	flow rate	1.3	m/sec
flow volume	0.041	cu.mtrs.per sec	flow volume	0.041	cu.mtrs.per sec	flow volume	0.041	cu.mtrs.per sec
flow volume	2.451	cu.mtrs .per min	flow volume	2.451	cu.mtrs .per min	flow volume	2.451	cu.mtrs .per min
3.142			3.142			3.142		
0.1			0.1			0.1		

JAN
2001

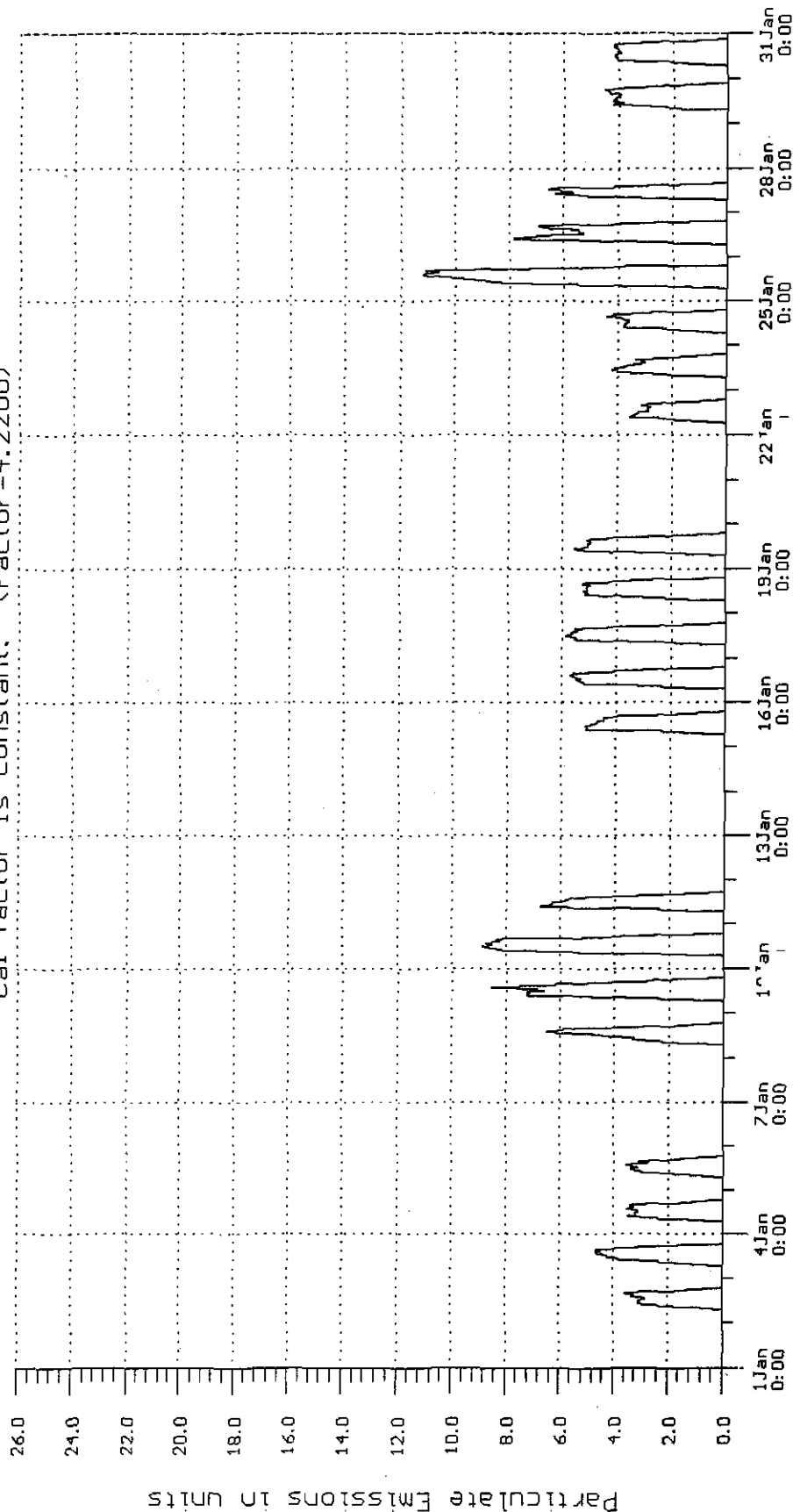
BANBURY EXTRACTOR

EPA REPORT Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 25 May 2001
Company: DAREX UK LTD
CROMWELL ROAD,
CAMBS. PE192ER
Contact: MR. G. DRAPER
(01480) 324459
EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 1.91
Maximum time-weighted average emission level: 11.20

Cal factor is constant. (Factor=4.2200)



Day / Hour:Minutes, Year 2001

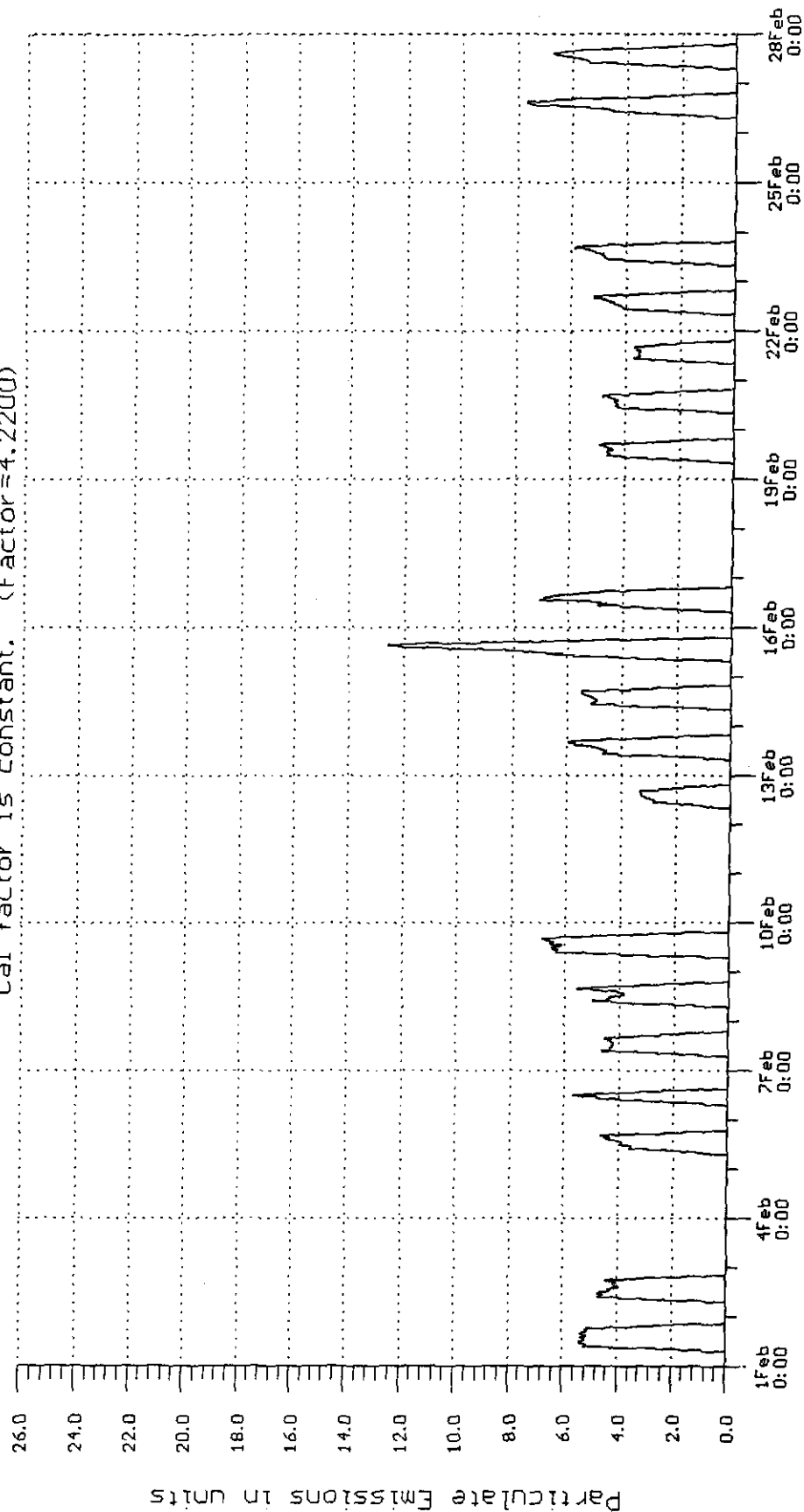
FEB
2001

EPA REPORT Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 25 May 2001
Company: DAREX UK LTD
CROMWELL ROAD, ST. NEOTS.
CAMBS. PE192ER
Contact: MR. G. DRAPER
(01480) 324459
EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 2.08
Maximum time-weighted average emission level: 12.60

Cal factor is constant. (Factor=4.2200)



Day / Hour:Minutes, Year 2001

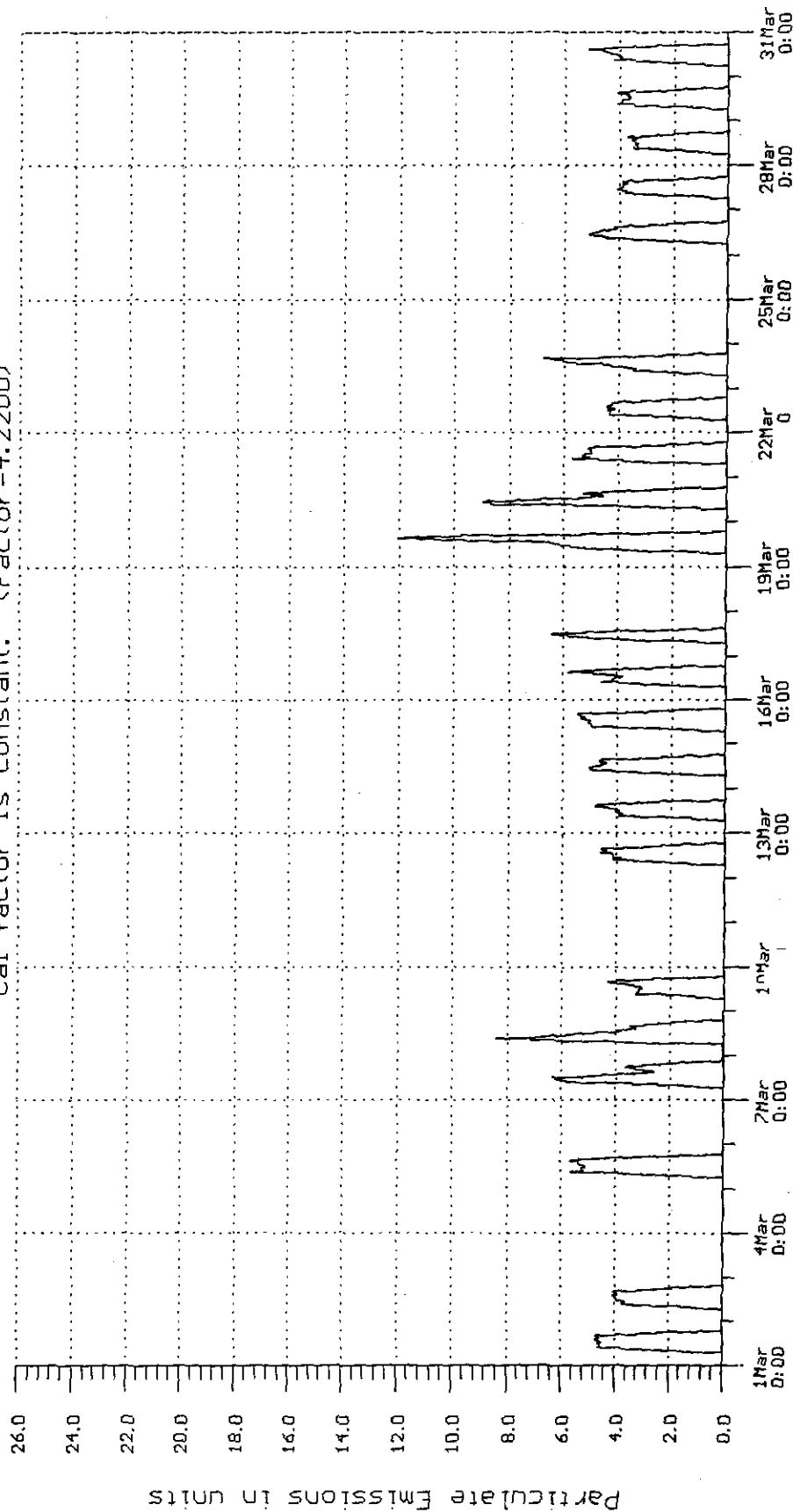
MAR
2001

EPA REPORT Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 25 May 2001
Company: DAREX UK LTD
CROMWELL ROAD, ST. NEOTS.
CAMBS. PE192ER
Contact: MR. G. DRAPER
(01480) 324459
EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 1.98
Maximum time-weighted average emission level: 12.00

Cal factor is constant. (Factor=4.2200)



Day / Hour:Minutes, Year 2001

Fine interval = 1 day

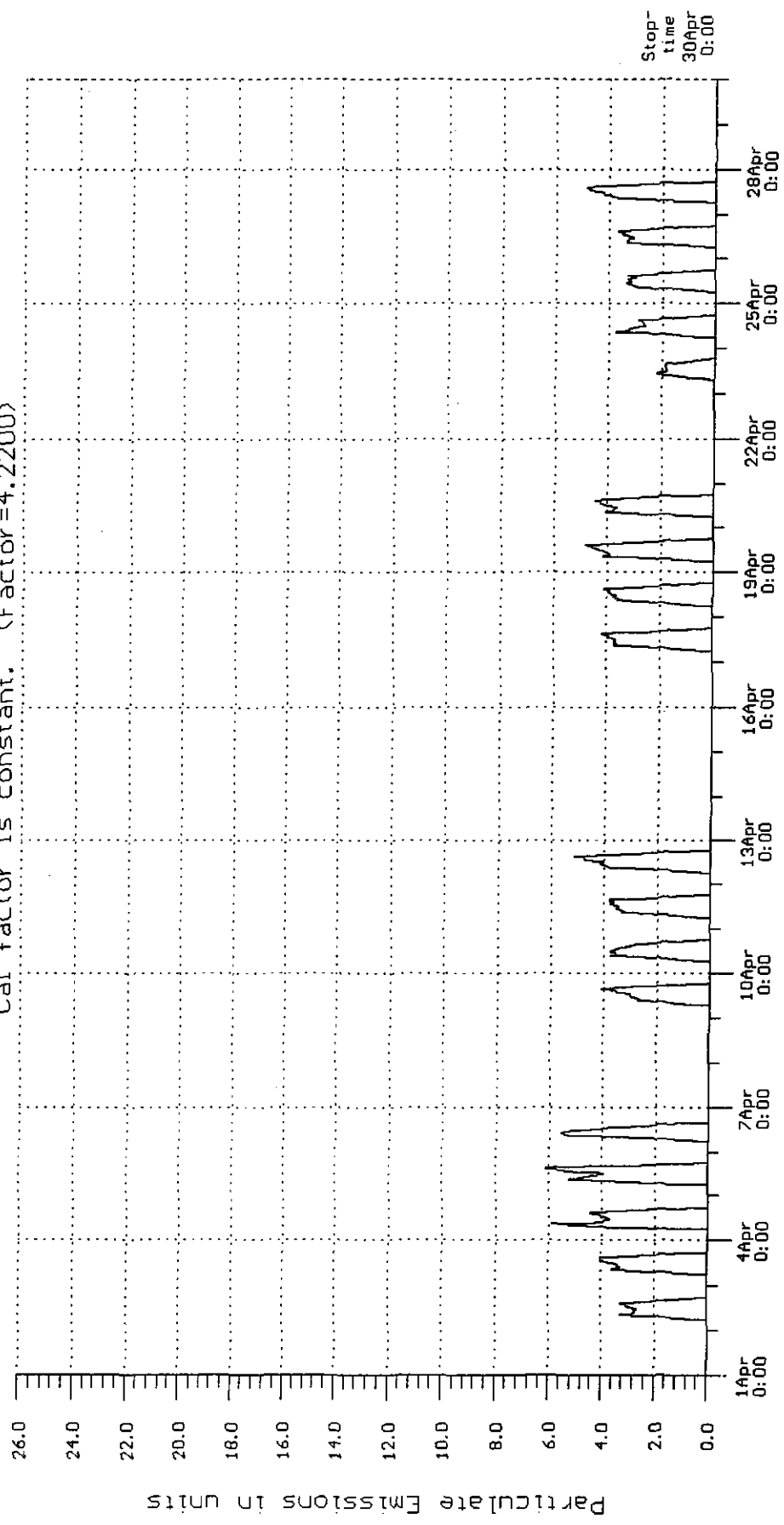
APR
2001

E P A R E P O R T Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 25 May 2001
Company: DAREX UK LTD
CROMWELL ROAD, ST. NEOTS.
CAMBS. PE192ER
Contact: MR. G. DRAPER
(01480) 324459
EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 1.35
Maximum time-weighted average emission level: 6.15

Cal factor is constant. (Factor=4.2200)



Day / Hour:Minutes, Year 2001 Fine interval = 1 day

MAY
2001

EPA REPORT Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 5 Jul 2001

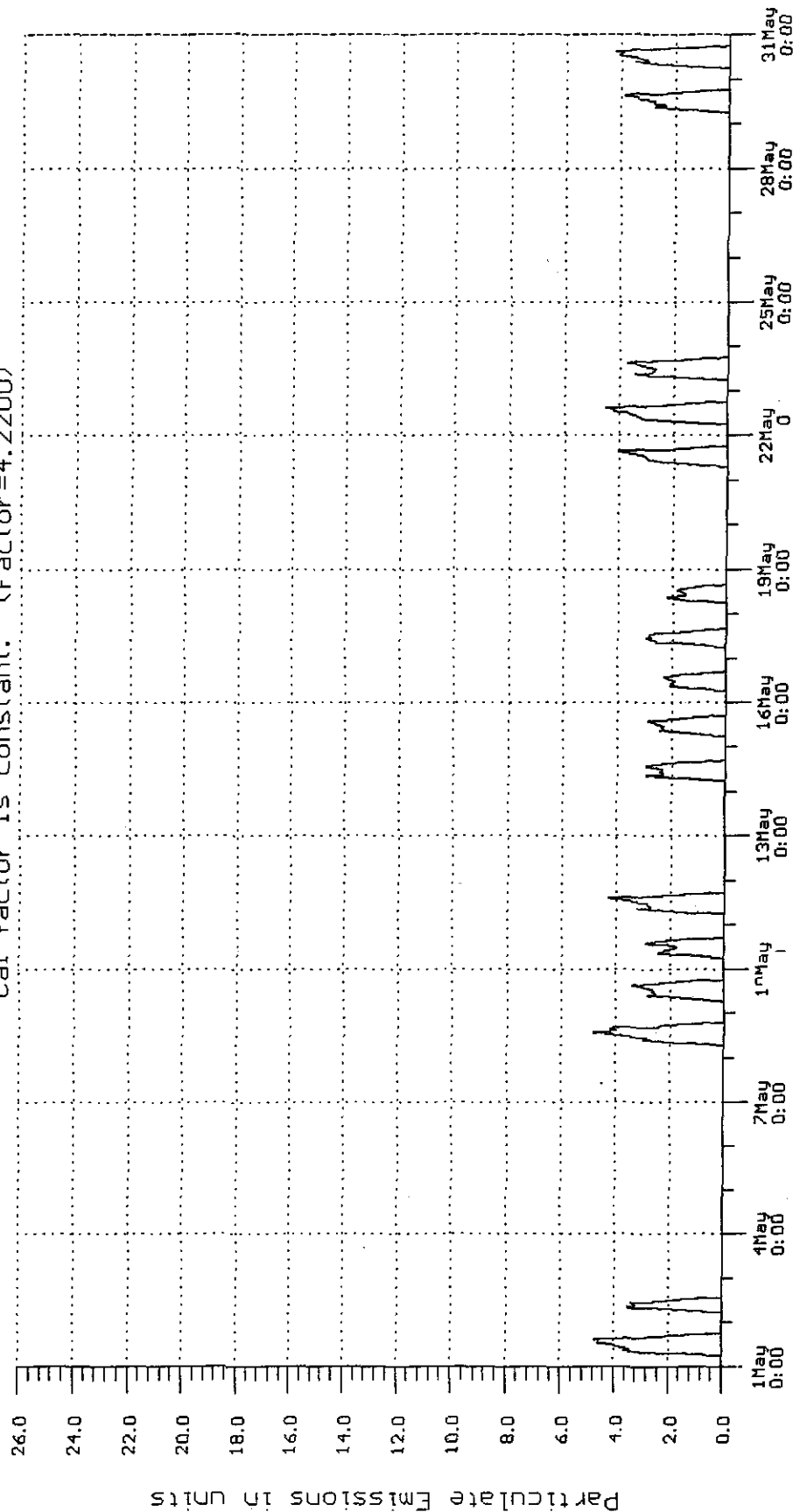
Company: DAREX UK LTD
CROMWELL ROAD, ST. NEOTS.
CAMBS. PE192ER

Contact: MR. G. DRAPER
(01480) 324459

EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 0.893
Maximum time-weighted average emission level: 4.84

Cal factor is constant. (Factor=4.2200)



Day / Hour:Minutes, Year 2001

502
2001

E P A R E P O R T Channel: CHD1 (Address 01) (revision 6.2e 07.03.2000)

Date: 5 Jul 2001

Company: DAREX UK LTD
CROMWELL ROAD,
CAMBS. PE192ER

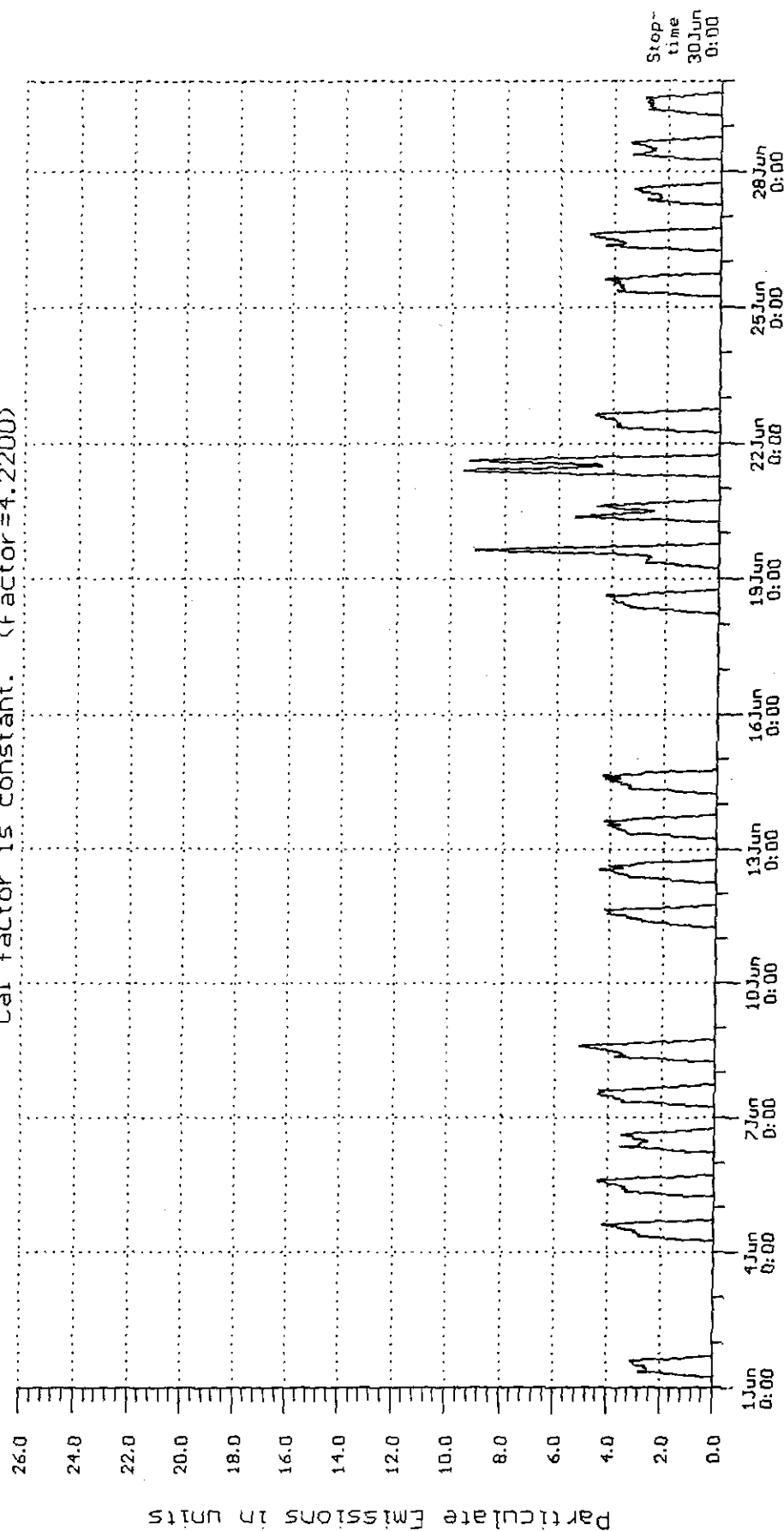
Contact: MR. G. DRAPER

(01480) 324459

EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 1.52
Maximum time-weighted average emission level: 9.49

Cal factor is constant. (Factor=4.2200)



Day / Hour:Minutes, Year 2001

Fine interval = 1 day

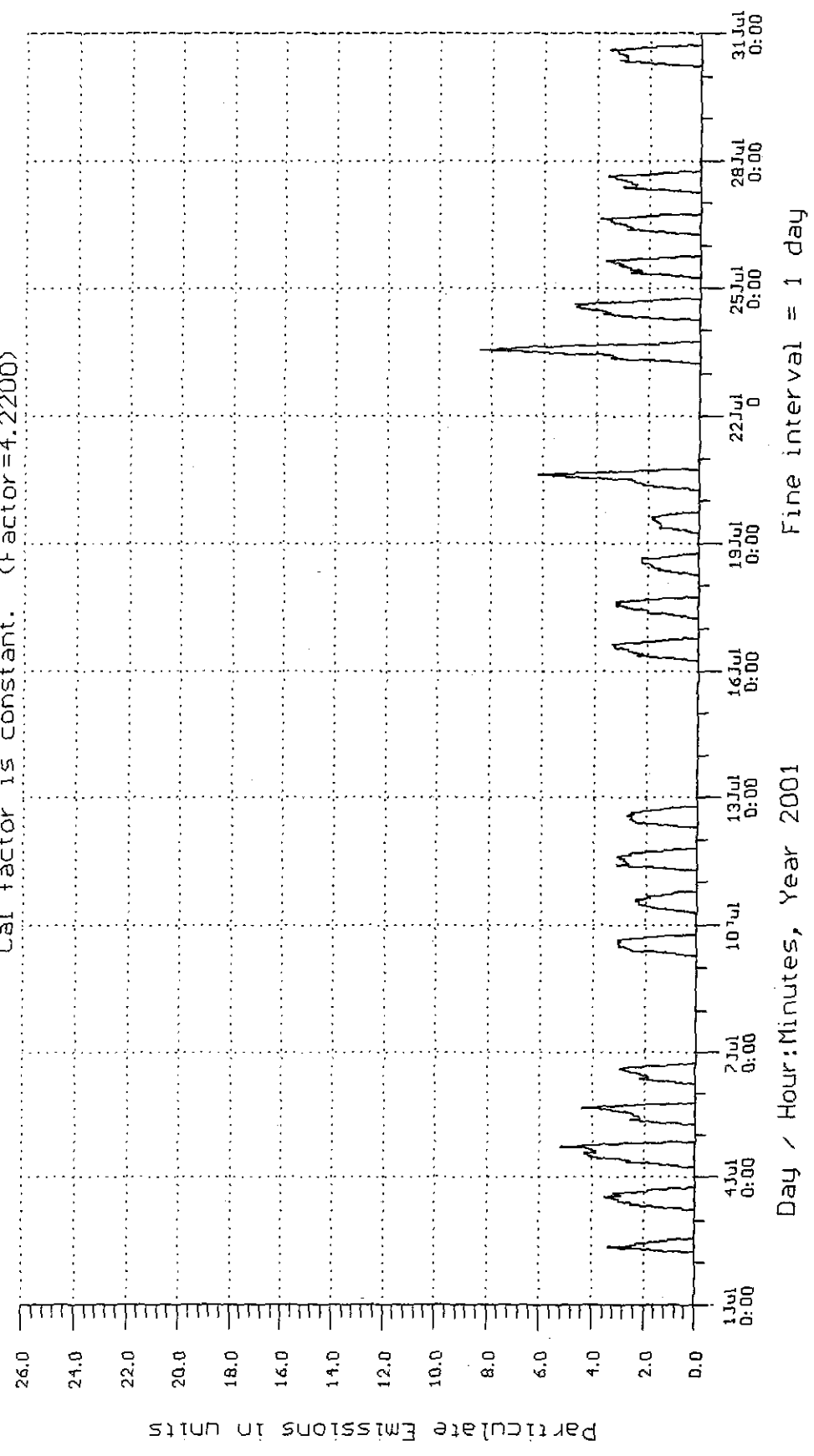
JUL
2001

EPA REPORT Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 25 Sep 2001
Company: DAREX UK LTD
CROMWELL ROAD, ST. NEOTS.
CAMBS. PE192ER
Contact: MR. G. DRAPER
(01480) 324459
EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 1.17
Maximum time-weighted average emission level: 8.44

Cal factor is constant. (Factor=4.2200)



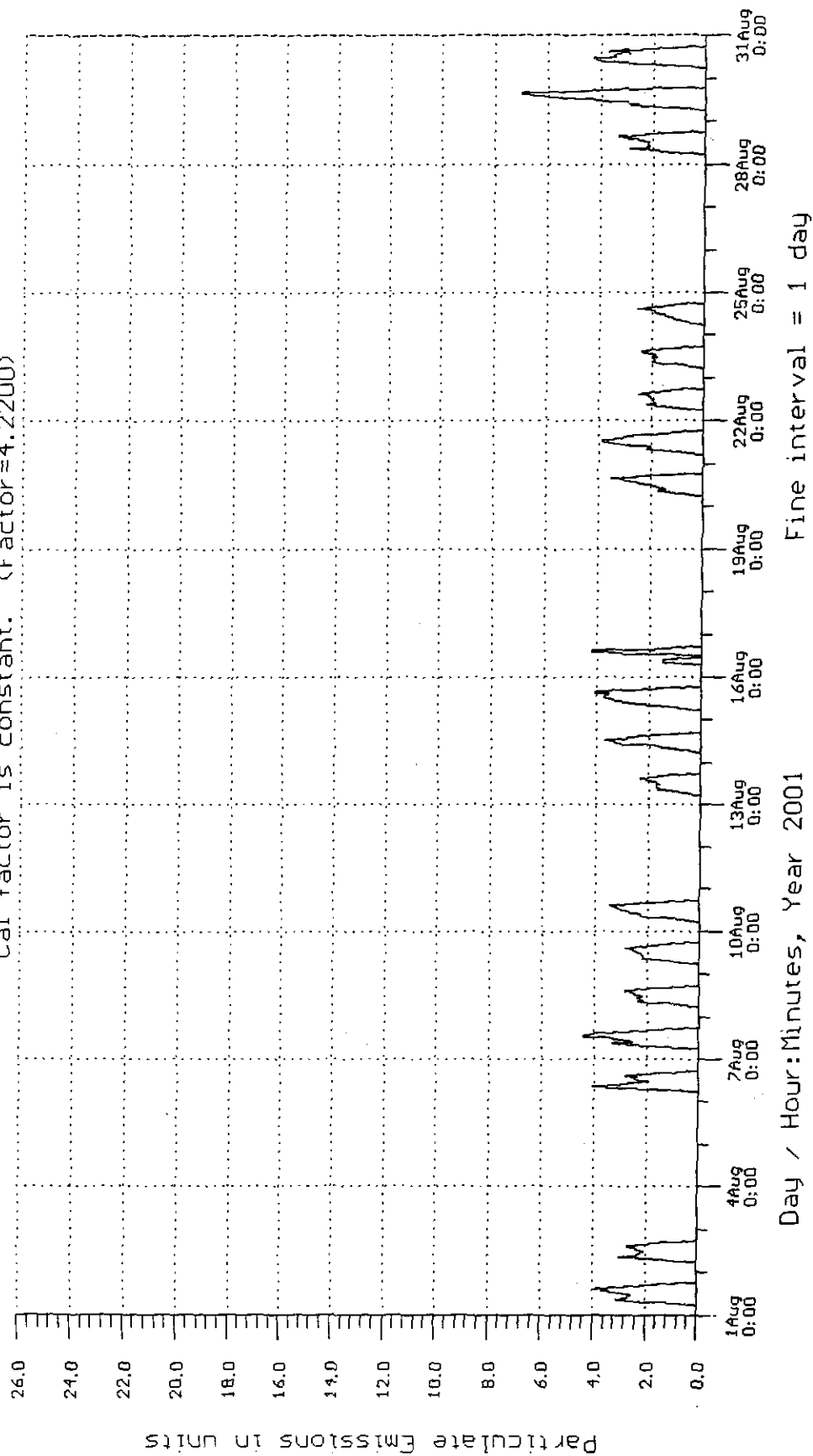
AUG
2001

E P A R E P O R T Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 25 Sep 2001
Company: DAREX UK LTD
CROMWELL ROAD, ST. NEOTS.
CAMBS. PE192ER
Contact: MR. G. DRAPER
(01480) 324459
EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 1.13
Maximum time-weighted average emission level: 7.00

Cal factor is constant. (Factor=4.2200)



SEP

2001

EPA REPORT Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

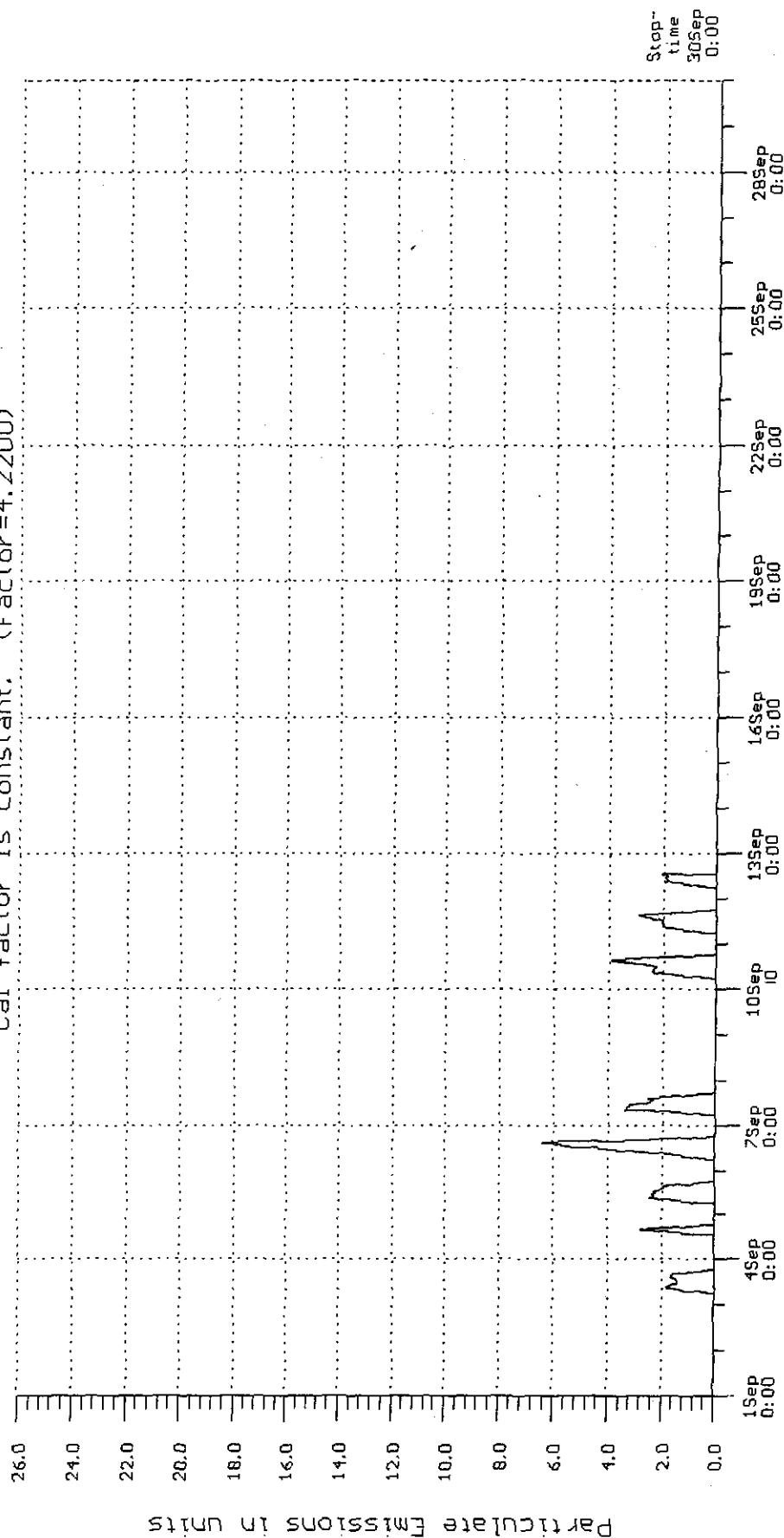
Date: 5 Nov 2001

Company: DAREX UK LTD
CROMWELL ROAD,
CAMBS. PE192ERContact: MR. G. DRAPER
(01480) 324459

EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 0.884
Maximum time-weighted average emission level: 6.40

Cal factor is constant. (Factor=4.2200)



Day / Hour:Minutes, Year 2001

Fine interval = 1 day

OCT
2001

EPA REPORT Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 5 Nov 2001

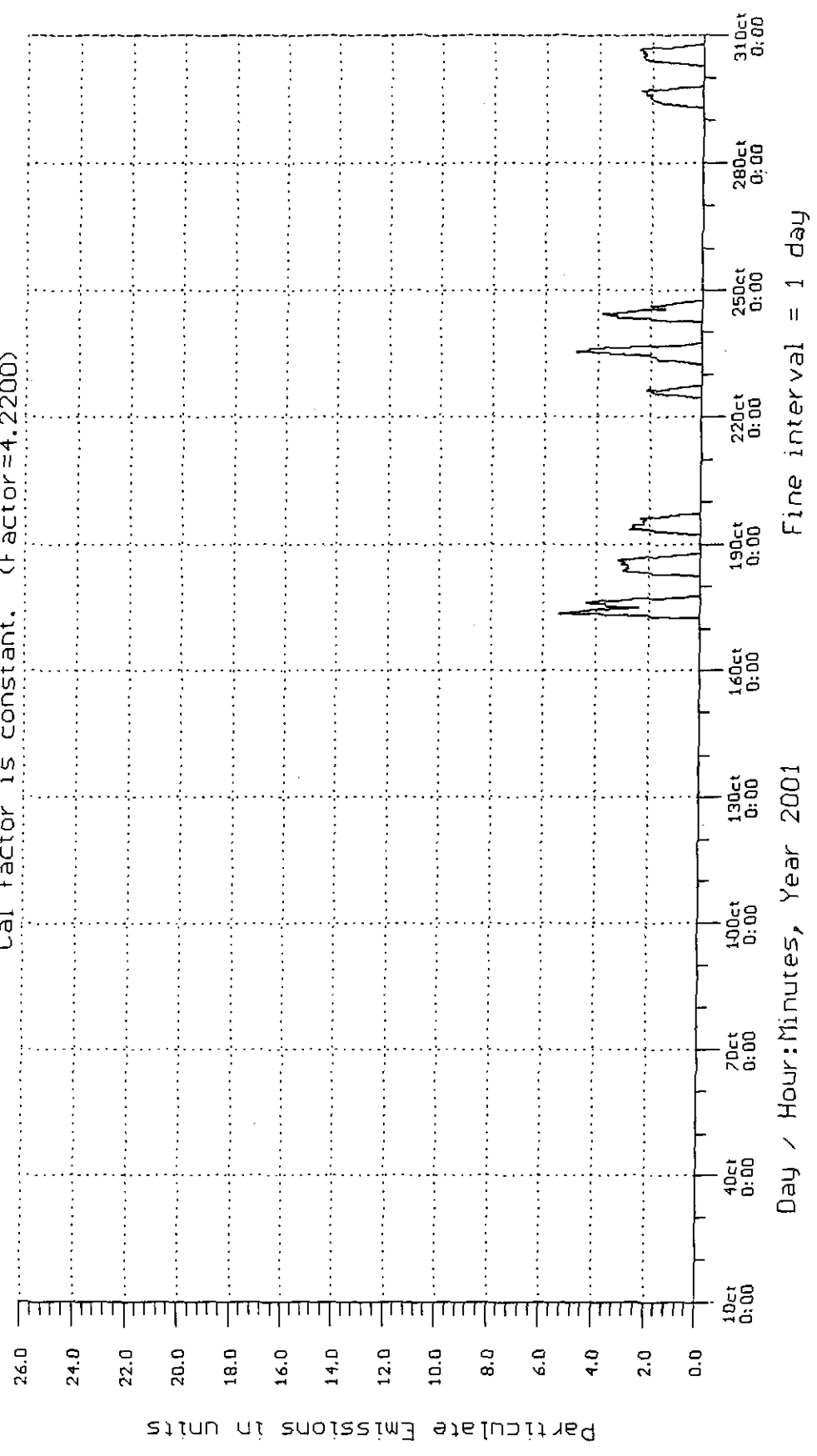
Company: DAREX UK LTD
CROMWELL ROAD,
CAMBS. PE192ER

Contact: MR. G. DRAPER
(01480) 324459

EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 1.52
Maximum time-weighted average emission level: 5.41

Cal factor is constant. (Factor=4.2200)



NOV
2001

EPA REPORT Channel: CH01 (Address 01) (revision 6.2e 07.03.2000)

Date: 7 Dec 2001

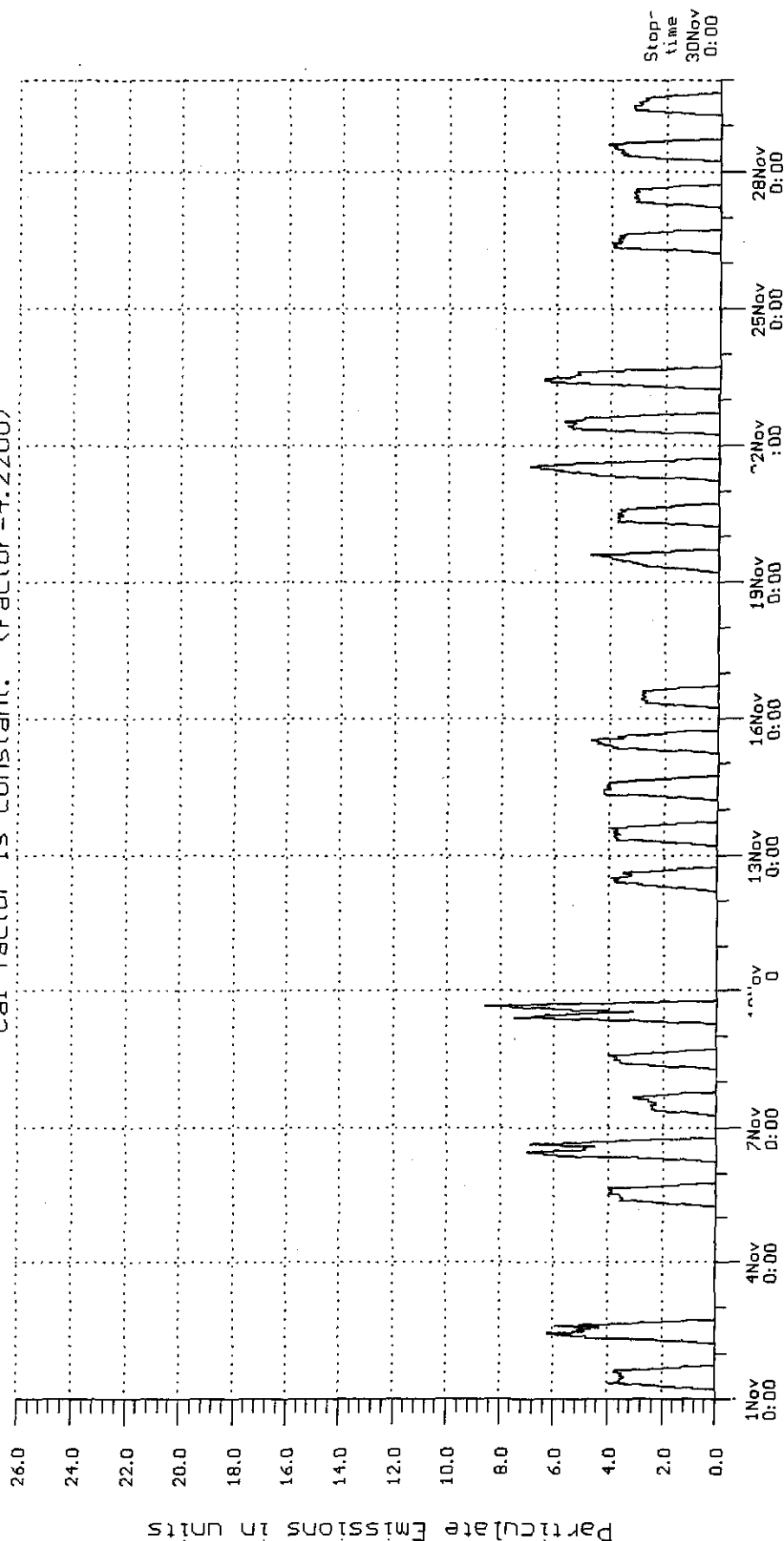
Company: DAREX UK LTD
CROMWELL ROAD, ST. NEOTS.
CAMBS. PE192ER

Contact: MR. G. DRAPER
(01480) 324459

EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 2.49
Maximum time-weighted average emission level: 8.54

Cal factor is constant. (Factor=4.2200)



Fine interval = 1 day

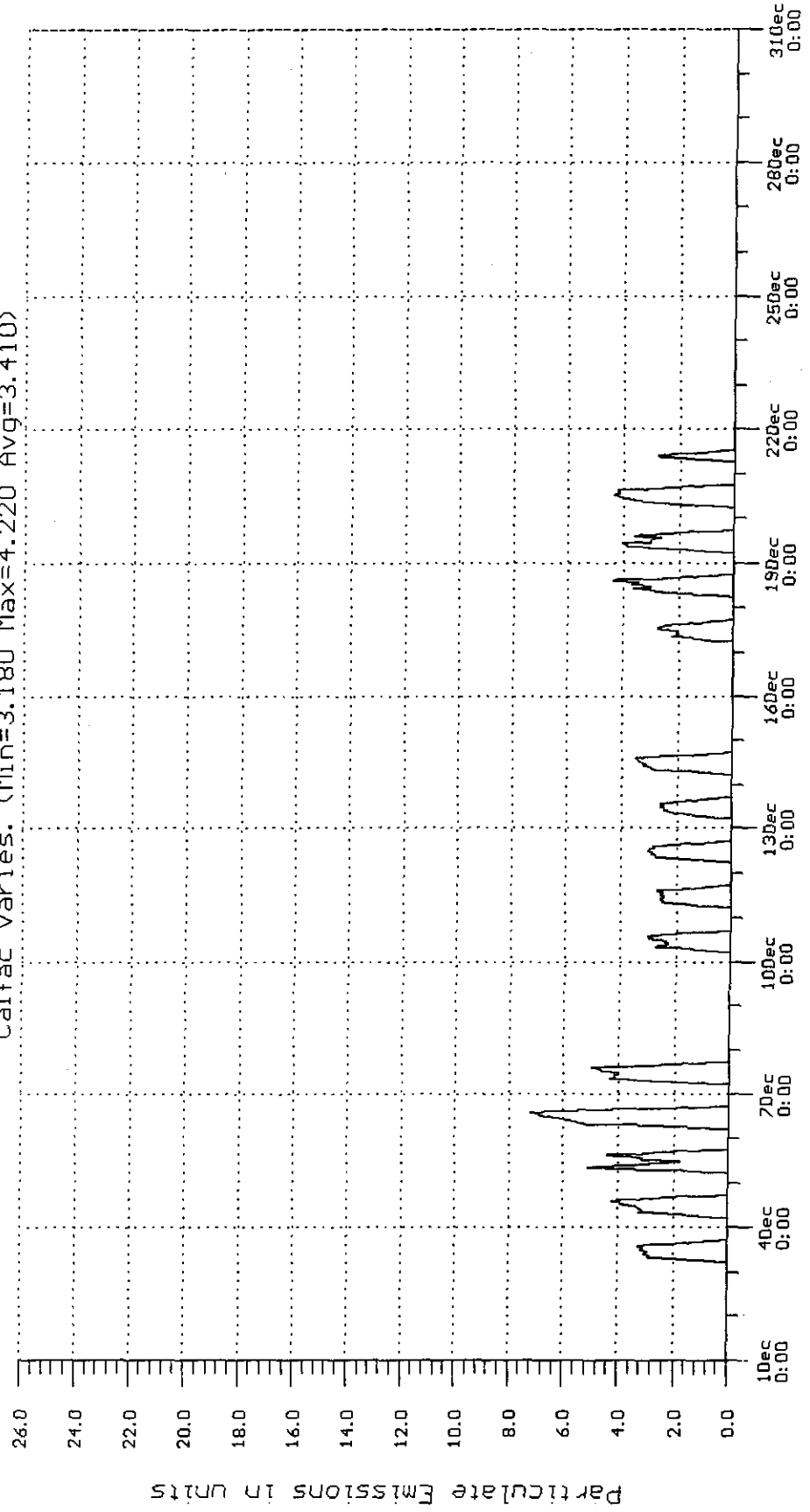
DEC 01

EPA REPORT Channel: Banbury (Address 01) (revision 6.2e 07.03.2000)

Date: 15 Jan 2002
Company: DAREX UK LTD
CROMWELL ROAD, ST. NEOTS.
CAMBS. PE192ER
Contact: MR. G. DRAPER
(01480) 324459
EPA authorisation number(s):

Requested Data averaging time period: 3.00 hours
Average emission level: 1.75
Maximum time-weighted average emission level: 7.18

Calfac varies. (Min=3.180 Max=4.220 Avg=3.410)



Day / Hour:Minutes, Year 2001 Fine interval = 1 day