

NATIONAL RIVERS AUTHORITY THAMES REGION
BIOLOGY
THAMES ESTUARY BENTHIC PROGRAMME

Thames Estuary Sediment Contaminant Levels
1st Quarter 1990 (Jan-Mar)



NRA
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NRA Thames 82



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THAMES ESTUARY SEDIMENT CONTAMINANT ANALYSIS, JAN-MAR 1990

Introduction.

This document presents the results from the first full set of sediment samples taken from the Thames estuary during the first quarter of 1990 (January-March). These samples were analysed for a full suite of metal and organic contaminants by the NAMAS tested laboratories at NRA Severn-Trent region.

Site positions.

A total of 28 samples were taken for analysis from 22 sites along the length of the Thames estuary from Teddington to Sea Reach No.2 Buoy (Fig.1). Table 1 presents full site details.

Suite of contaminants.

The sediment samples were analysed for the following contaminants.

Metals: Cd, Cr, Cu, Pb, Ni, Zn, Ag, Sn, V, Al, Fe, Mn, Hg, As.

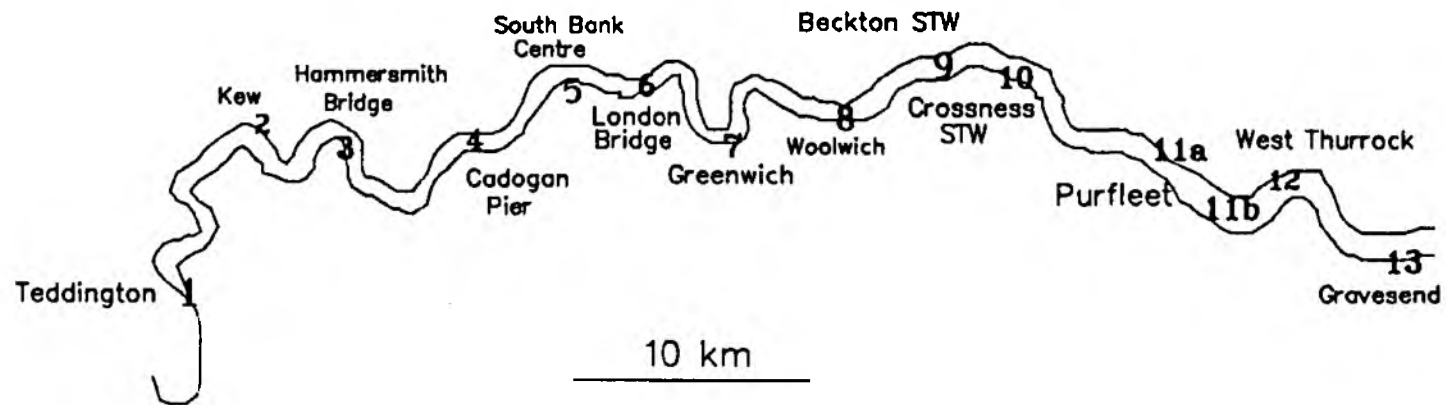
Organics: Alpha HCH, Hexachlorobenzene, Gamma HCH, Delta HCH, Aldrin, p'p DDE, Dieldrin, Endrin, o'p DDT, p'p DDT, PCB Nos. 28, 52, 101, 118, 138, 153, 180.

Results.

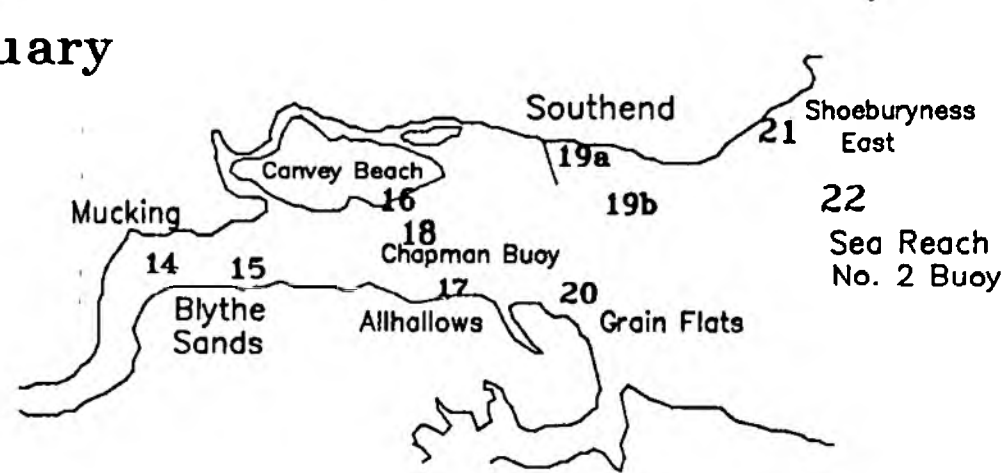
The levels recorded for metals are reported in Section 1, with corresponding organic levels in Section 2. Many organic results could not be determined (ND) due to interference from similar species preventing clear definition of the chemical in question. As a result of the discontinuous data set, organic results are plotted as histograms. Values

Figure 1.

1. Teddington to Gravesend



2. Outer Estuary



Position of Thames Estuary Benthic Programme Sample Sites

Table 1
Thames Estuary Benthic Programme Sediment Sample Sites

<u>Site</u>	<u>Abbrev.</u>	<u>Site Name</u>	<u>NGR</u>	<u>Type</u>	<u>Km from LB</u>
1.	T	Teddington	TQ 168 715	Subtidal Kick	-30.5
2.	K	Kew	TQ 191 779	Subtidal Kick	-23.6
3.	HB	Hammersmith Bridge	TQ 230 780	Intertidal	-14.8
4.	CP	Cadogan Pier	TQ 274 776	Subtidal Kick	- 7.4
5.	SBC	South Bank Centre	TQ 308 803	Intertidal	- 2.3
6.	LB	London Bridge	TQ 327 805	Subtidal Kick	- 0.2
7.	GW	Greenwich	TQ 383 780	Intertidal	7.7
8i.	WWi	Woolwich	TQ 427 793	Intertidal	14.5
8s.	WWs	Woolwich	TQ 429 794	Subtidal Grab	15.0
9.	BK	Beckton	TQ 456 815	Subtidal Grab	18.3
10i.	XNi	Crossness	TQ 492 809	Intertidal	22.5
10s.	XNs	Crossness	TQ 494 809	Subtidal Grab	22.7
11i.	Pi	Purfleet	TQ 548 786	Intertidal	30.8
11s.	Ps	Purfleet	TQ 580 761	Subtidal Grab	34.7
12i.	WTi	West Thurrock	TQ 592 770	Intertidal	36.0
12s.	WTs	West Thurrock	TQ 593 770	Subtidal Grab	36.1
13i.	GVi	Gravesend	TQ 648 745	Intertidal	42.5
13s.	GVs	Gravesend	TQ 649 746	Subtidal Grab	42.6
14.	MK	Mucking	TQ 707 808	Subtidal Grab	52.4
15.	BS	Blythe Sands	TQ 757 805	Subtidal Grab	56.3
16.	CB	Canvey Beach	TQ 800 824	Intertidal	61.1
17.	AH	Allhallows	TQ 838 792	Intertidal	64.5
18.	CHB	Chapman Buoy	TQ 809 813	Subtidal Grab	62.5
19i.	SEi	Southend	TQ 888 844	Intertidal	69.5
19s.	SEs	Southend	TQ 901 828	Subtidal Grab	71.8
20.	GF	Grain Flats	TQ 877 795	Subtidal Grab	69.0
21.	SNE	Shoeburyness East	TQ 949 850	Intertidal	75.2
22.	SR2	Sea Reach No.2 Buoy	TQ 955 810	Subtidal Grab	77.6

below the limit of detection are plotted at this limit, whereas non-determined values are left blank. Values for the <90 µm were plotted.

The peak values for each contaminant were as follows:

Metals

Cadmium - Hammersmith Bridge, 3.6 mg/kg.
Chromium - Hammersmith Bridge, 126 mg/kg.
Copper - South Bank Centre, 176 mg/kg.
Lead - South Bank Centre, 163⁴ mg/kg.
Nickel - Hammersmith Bridge, 83 mg/kg.
Zinc - Hammersmith Bridge, 538 mg/kg.
Silver - Hammersmith Bridge, 8.6 mg/kg (also note 2nd peak at Allhallows, 5.1 mg/kg).
Tin - South Bank Centre, 69 mg/kg.
Vanadium - Cadogan Pier, 9⁴ mg/kg.
Aluminium - Cadogan Pier, 35⁴70 mg/kg.
Iron - Hammersmith Bridge, 47800 mg/kg.
Manganese - Hammersmith Bridge, 1490 mg/kg.
Mercury - South Bank Centre, 3.0⁴ mg/kg.
Arsenic - Several Peaks (mg/kg): Hammersmith Bridge, 21.1⁴; London Bridge, 19.72; Crossness intertidal, 19.2⁴; West Thurrock intertidal, 16.53.

Organics

Alpha HCH - Hammersmith Bridge, 129 µg/kg.
Hexachlorobenzene - Hammersmith Bridge, 38 µg/kg.
Gamma HCH - Hammersmith Bridge, 6 µg/kg.
Delta HCH - No samples above detection limit (no figure).
Aldrin - Canvey Beach, 1⁴ µg/kg.
p'p DDE - Greenwich, 90 µg/kg.
Dieldrin - No samples above detection limit (no figure).
Endrin - Hammersmith Bridge, 43 µg/kg.
o'p DDT - Purfleet subtidal, 115 µg/kg.
p'p DDT - Hammersmith Bridge, 13380 µg/kg*.
PCB 28 - Hammersmith Bridge, 15 µg/kg.
PCB 52 - Allhallows, 19 µg/kg.

PCB 101 - Purfleet intertidal, 163 µg/kg.

PCB 118 - Southend intertidal, 16 µg/kg.

PCB 138, PCB 153, PCB 180 - No samples above detection limit (no figures).

* this value represents a 1.34% DDT.

Further samples.

Samples taken during quarter 2.1990. (Apr-Jun) are with Severn-Trent for analysis. These results will confirm whether some of these elevated levels (especially at Hammersmith Bridge) are permanent features of the sediment at these sites or temporary one-off levels.

Martin Attrill

20.8.90.

SECTION 1: METAL LEVELS



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Severn-Trent Region

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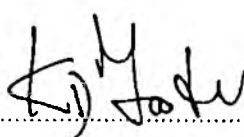
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Page 2 of 6

THAMES SEDIMENTS

1 results expressed as mg/kg dry solids.

	HB		K		T		AH		GV		CB	
	MA141		MA142		MA144		MA145		MA146		MA147	
	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um
Pb	3.6	1.1	2.6	1.3	1.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Cr	126	31	89	23	49	15	36	20	50	15	38	11
Cu	124	48	100	62	87	31	21	16	37	25	21	7.5
Pb	383	170	330	267	399	157	37	32	76	117	40	18
Ni	83	18	56	23	35	17	22	14	29	11	22	7.9
Zn	538	166	357	162	314	125	93	88	139	103	97	54
Ag	8.6	1.9	8.0	<0.5	3.1	<0.5	5.1	<0.5	2.7	<0.5	1.5	0.6
Cd	12	13	8.6	8.6	10	8.1	21	<2	14	8.0	23	<2
V	59	18	53	28	43	21	43	28	47	15	44	15
Al	21200	3630	19900	2700	15000	2270	12900	4700	16100	3500	14000	3600
Fe	47800	13670	31000	20400	32600	17400	21500	15200	24100	12670	21000	9400
Mn	1490	286	710	224	690	198	343	173	467	247	337	174
Hg	1.37	0.48	0.89	0.43	0.52	0.37	0.24	0.28	0.38	0.24	0.34	0.11
As	21.14	6.63	11.74	10.64	4.64	10.16	11.90	10.40	11.78	5.20	12.06	6.80

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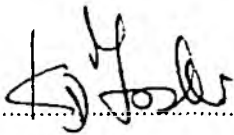
Page 3 of 6

THAMES SEDIMENTS

All results expressed as mg/kg dry solids.

	GW		SBC		SR2		SES		GF		CHB	
	MA148		MA149		MA150		MA151		MA152		MA153	
	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um
d	0.9	1.6	2.2	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Cr	70	40	26	19	21	7.6	33	7.0	22	12	38	9.8
Cu	61	80	176	36	6.7	1.1	14	<1.0	9.0	2.7	20	1.7
Pb	134	313	1634	162	4.9	6.7	23	6.6	20	12	34	19
Ni	37	29	39	14	12	3.9	18	4.3	12	11	23	7.9
Zn	217	244	227	121	48	27	83	25	45	39	98	40
Ag	6.1	4.6	4.2	<0.5	0.7	<0.5	0.9	<0.5	<0.5	<0.5	1.2	<0.5
Mn	11	11	69	11	28	<2	24	<2	17	<2	26	<2
V	55	34	34	18	29	13	46	14	27	15	46	18
Al	21500	9000	15400	1970	6570	1730	12000	1770	7100	3000	12900	1800
Fe	29900	27000	41500	10800	13200	6900	18900	7100	12900	8900	25000	13000
Mn	610	677	293	180	234	119	273	120	211	152	403	152
Hg	0.76	1.03	3.04	0.26	0.07	0.01	0.17	0.04	0.09	0.06	0.16	0.02
As	11.26	13.52	6.56	8.08	6.34	6.48	9.76	10.24	4.78	8.74	12.50	19.68

MA 149 <90 um, results may be incorrect due to low sample amount.

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Page 4 of 6

THAMES SEDIMENTS

1 results expressed as mg/kg dry solids.

BS

MK

LB

CP

W/Ws

BK

MA154

MA156

MA157

MA158

MA165

MA166

<90 um

90 -
500um

<90 um

90 -
500um

<90 um

90 -
500um

<90 um

90 -
500um

<90 um

90 -
500um

<90 um

90 -
500um

Cd

<0.5

<0.5

<0.5

<0.5

1.1

0.6

<0.5

0.5

1.1

1.5

0.7

0.8

Cr

21

10

47

20

58

25

68

31

81

67

53

22

Cu

11

2.8

28

11

78

104

34

46

71

79

42

38

Pb

22

10

58

27

334

489

115

662

152

175

99

90

Ni

10

6.5

24

10

34

25

54

23

45

36

30

13

Zn

55

41

111

71

248

465

140

143

242

284

153

131

Ag

0.6

<0.5

2.5

1.0

4.5

1.1

2.5

1.3

6.0

4.9

3.9

1.4

Cd

16

<2

18

6.5

10

42

29

19

24

4.8

20

<2

V

22

12

46

22

44

39

94

45

61

51

48

20

Al

5570

2370

14300

5670

16300

3070

35470

2800

24600

16470

18300

5000

Fe

11570

7500

22670

11400

28200

34400

41900

25670

34900

31800

26570

16100

Mn

194

139

347

191

560

330

370

216

750

770

486

423

Hg

0.16

0.06

0.31

0.17

1.08

2.06

0.06

4.99

1.11

2.20

0.58

1.75

S

7.50

6.72

2.14

7.52

19.72

17.84

15.40

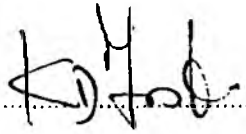
19.44

12.84

14.32

10.64

10.96

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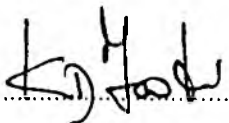
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Page 5 of 6

THAMES SEDIMENTS

1 results expressed as mg/kg dry solids.

	XNs		Ps		WTs		GVs		Pi		WTi	
	MA167		MA168		MA169		MA170		MA176		MA177	
	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um
cd	1.1	1.2	<0.5	0.7	<0.5	0.8	<0.5	0.8	1.2	1.9	1.4	0.9
Cr	48	22	49	13	49	17	32	13	60	78	73	66
Cu	47	36	34	13	35	18	19	11	43	84	52	63
Pb	120	71	73	29	58	35	44	28	88	155	110	127
Mn	28	12	30	6.8	26	10	18	8.5	36	39	40	37
Zn	155	142	116	63	119	92	76	68	158	317	184	220
Ag	3.2	0.9	2.7	<0.5	3.1	1.9	1.5	1.6	3.6	7.6	4.1	5.7
Sn	15	<2	22	3.0	3.3	<2	19	3.3	24	<2	16	10
V	43	18	51	14	45	18	33	15	51	66	63	60
Al	16570	3970	19700	3000	17400	3700	10970	2730	20000	19300	24000	22100
Fe	24900	16000	26700	11500	24500	13300	17400	10400	28700	39500	34100	39000
Mn	454	479	396	318	453	403	314	246	526	832	560	588
Hg	0.73	0.38	0.37	0.23	0.58	0.29	0.24	0.16	0.64	1.17	0.68	0.55
As	11.00	14.24	10.88	6.40	9.66	7.04	9.01	5.69	12.43	22.00	16.53	22.72

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Page 6 of 6

THAMES SEDIMENTS

All results expressed as mg/kg dry solids.

	SNE		SEi		WWi		XNi	
	MA178		MA179		MA180		MA181	
	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um	<90 um	90 - 500um
Cd	1.0	<0.5	1.3	0.7	0.7	1.4	0.6	0.9
Cr	25	7.2	37	6.7	59	47	80	76
Cu	13	2.2	24	8.8	46	61	64	68
Pb	29	10	45	41	99	153	105	135
Ni	16	4.2	21	4.3	35	26	42	55
Zn	60	30	104	51	163	239	202	227
Ag	1.1	0.6	1.8	<0.5	3.7	4.0	5.3	6.5
Sn	27	3.1	22	1.8	24	9.2	19	18
V	32	10	48	8.8	50	38	69	68
Al	7900	1530	13400	1200	19400	11330	26200	22000
Fe	13200	5600	21600	5130	27900	26600	36000	40000
Mn	164	77	323	61	527	680	649	588
Hg	0.15	0.03	0.33	0.08	0.95	0.78	0.80	0.73
As	6.20	4.21	12.13	4.22	12.13	12.80	19.24	19.28

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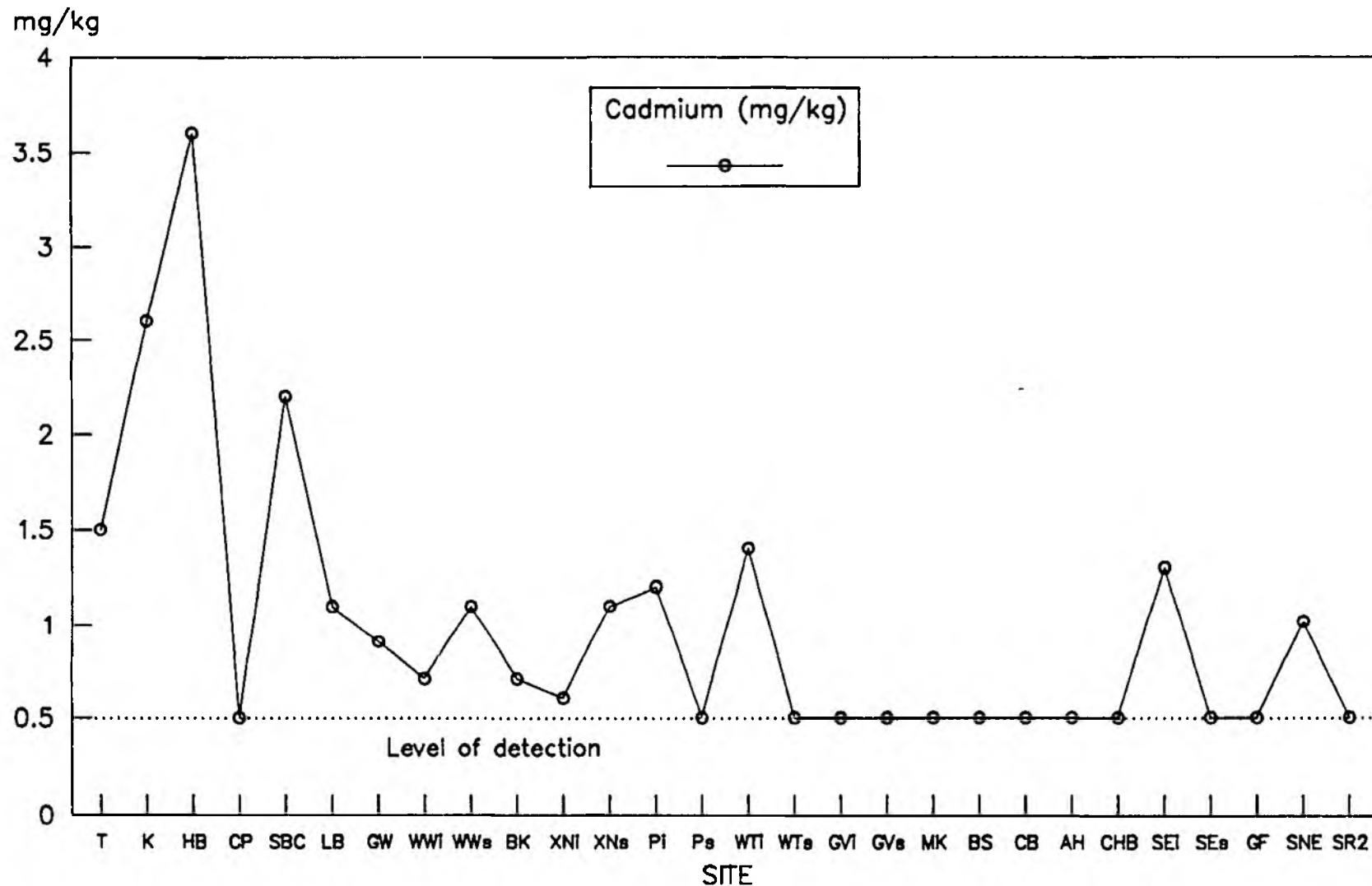
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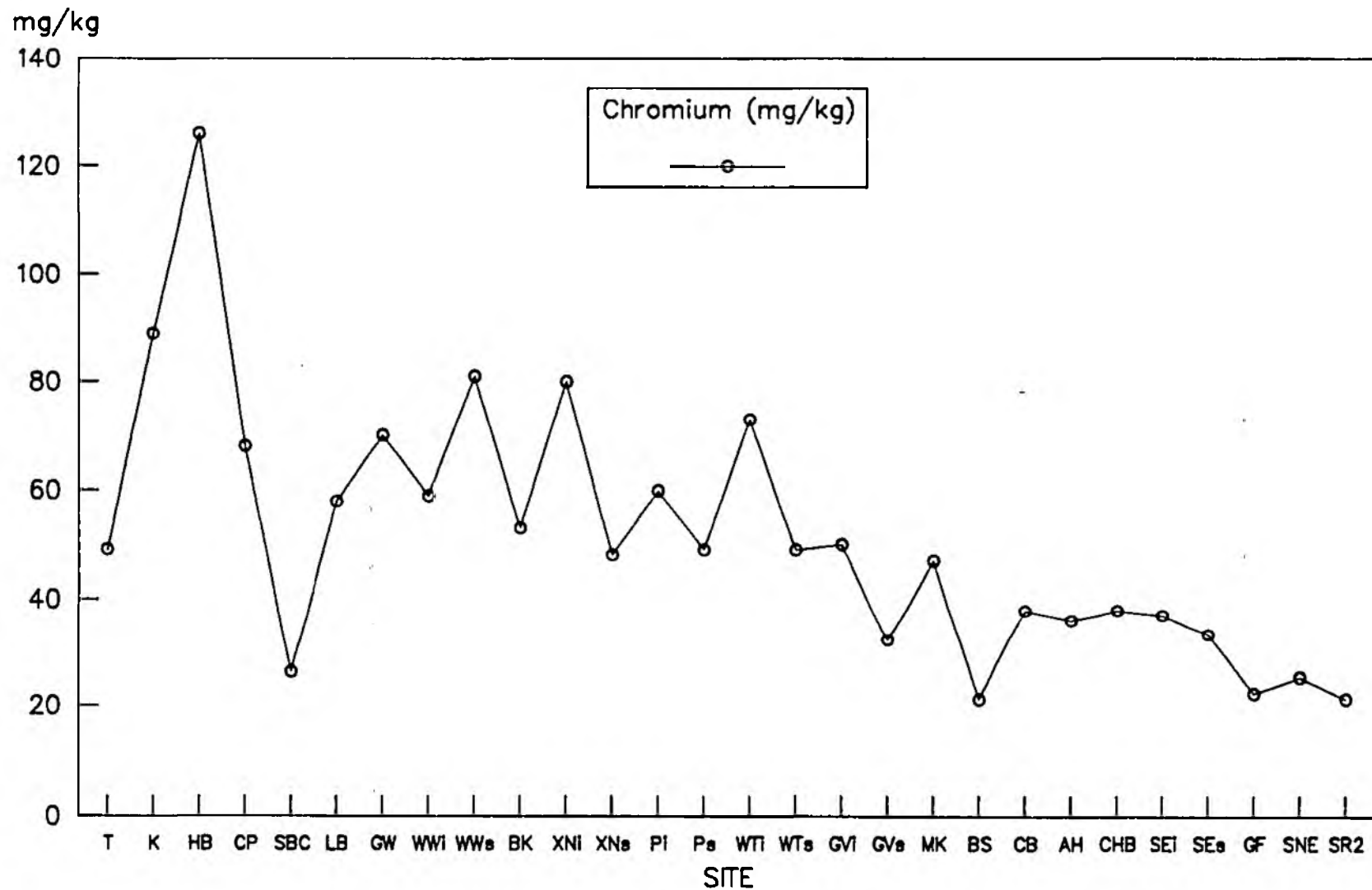
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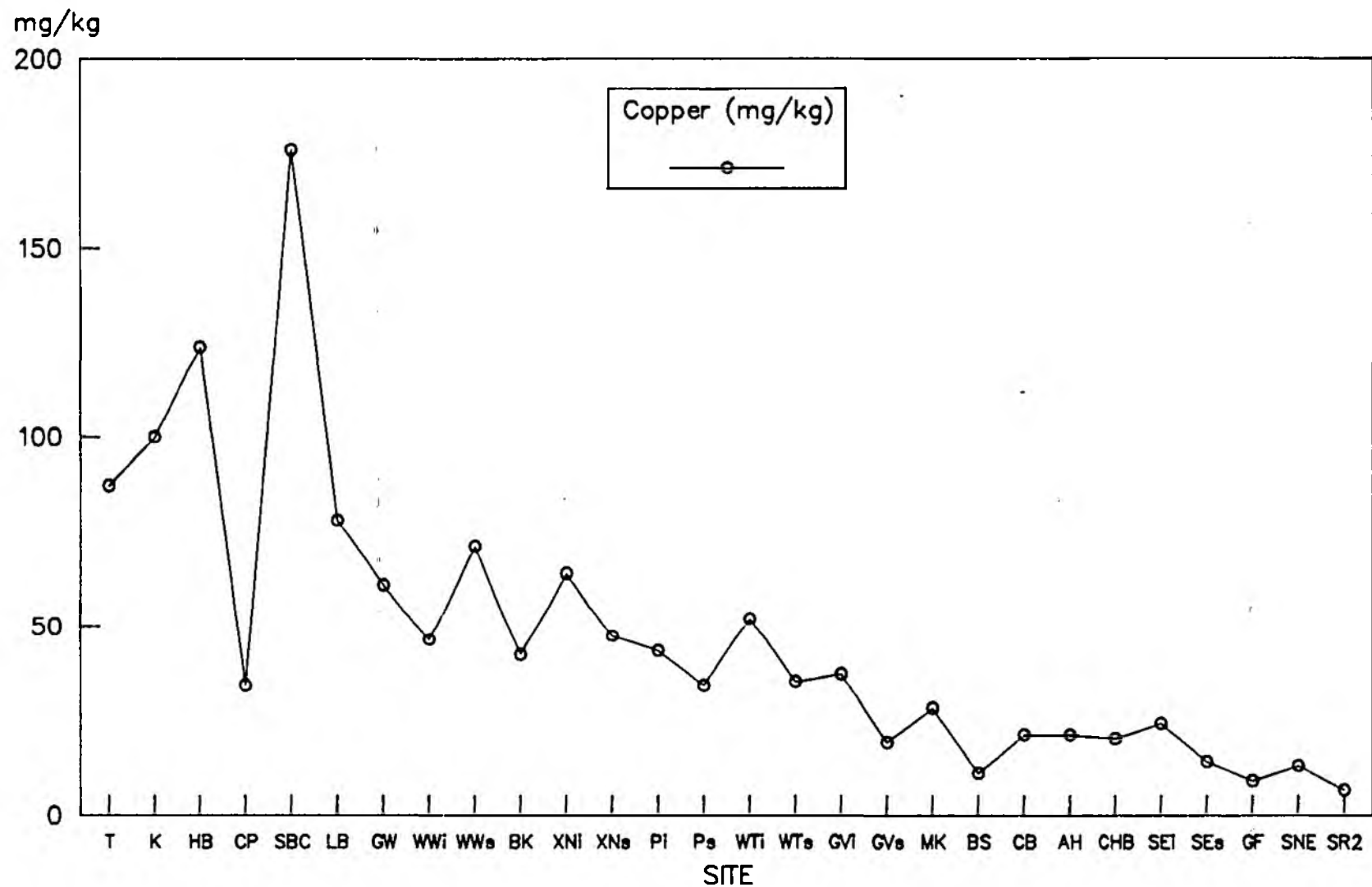
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
CADMIUM - QUARTER 1/90



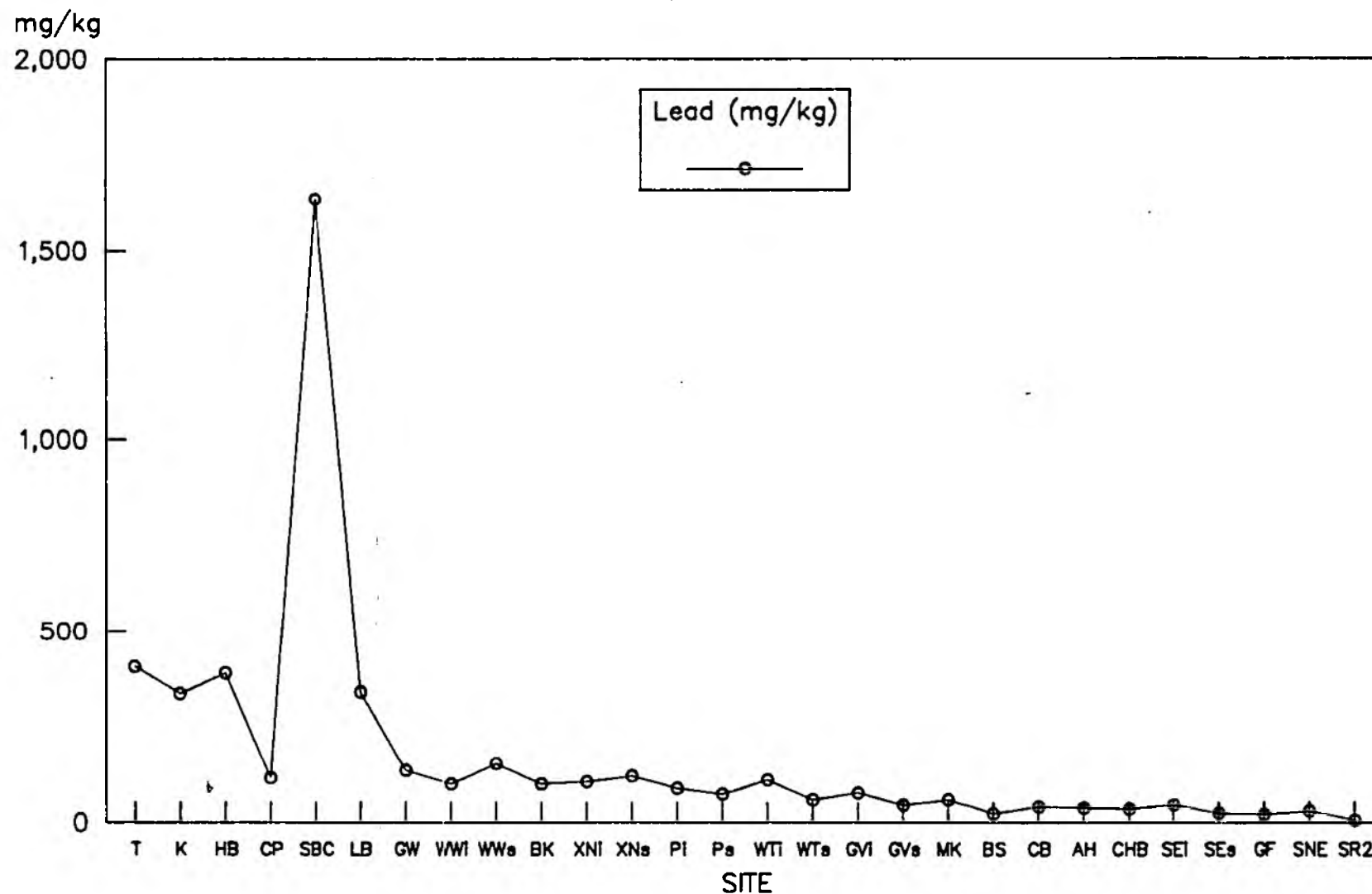
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
CHROMIUM - QUARTER 1/90



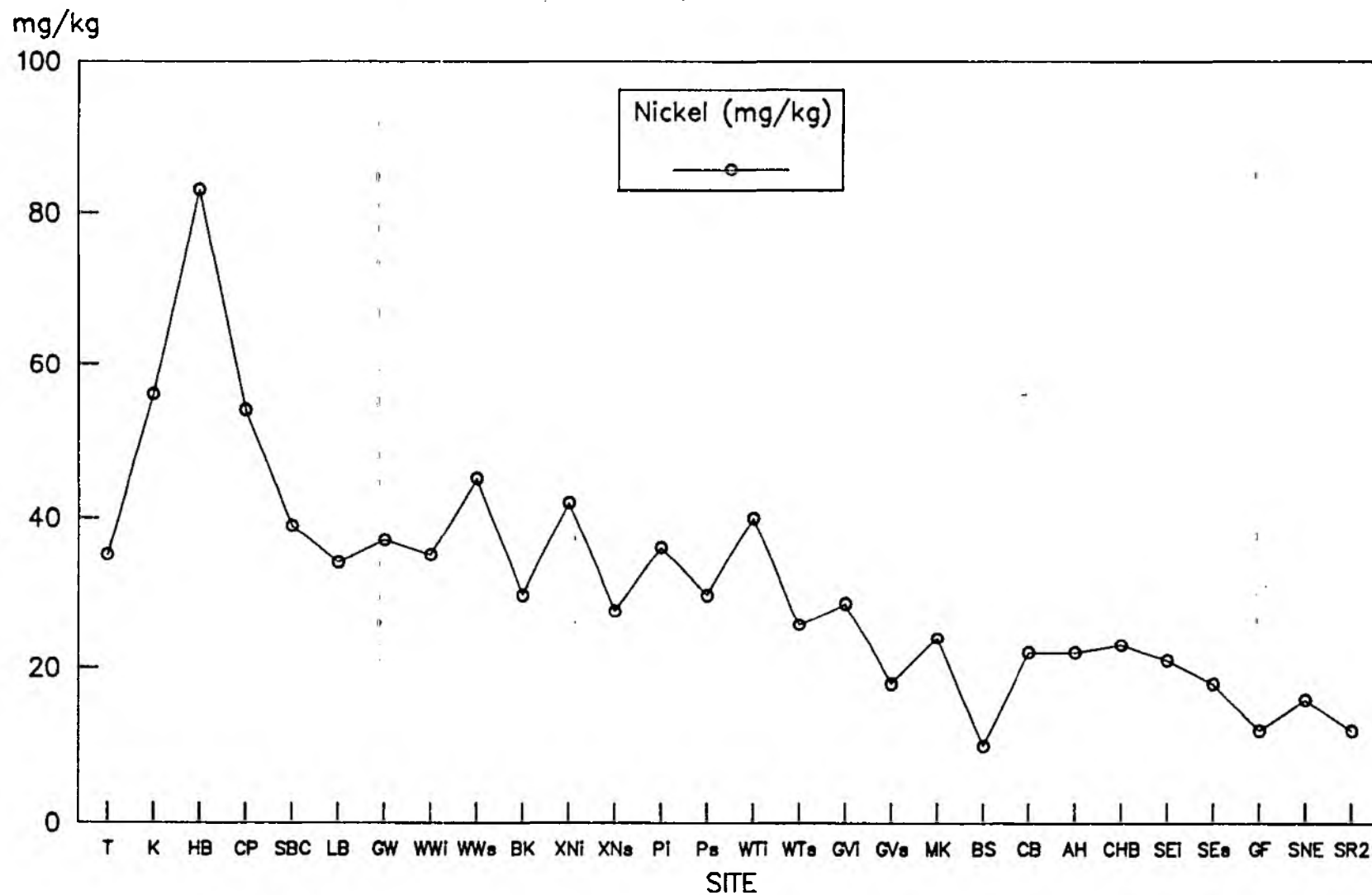
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
COPPER - QUARTER 1/90



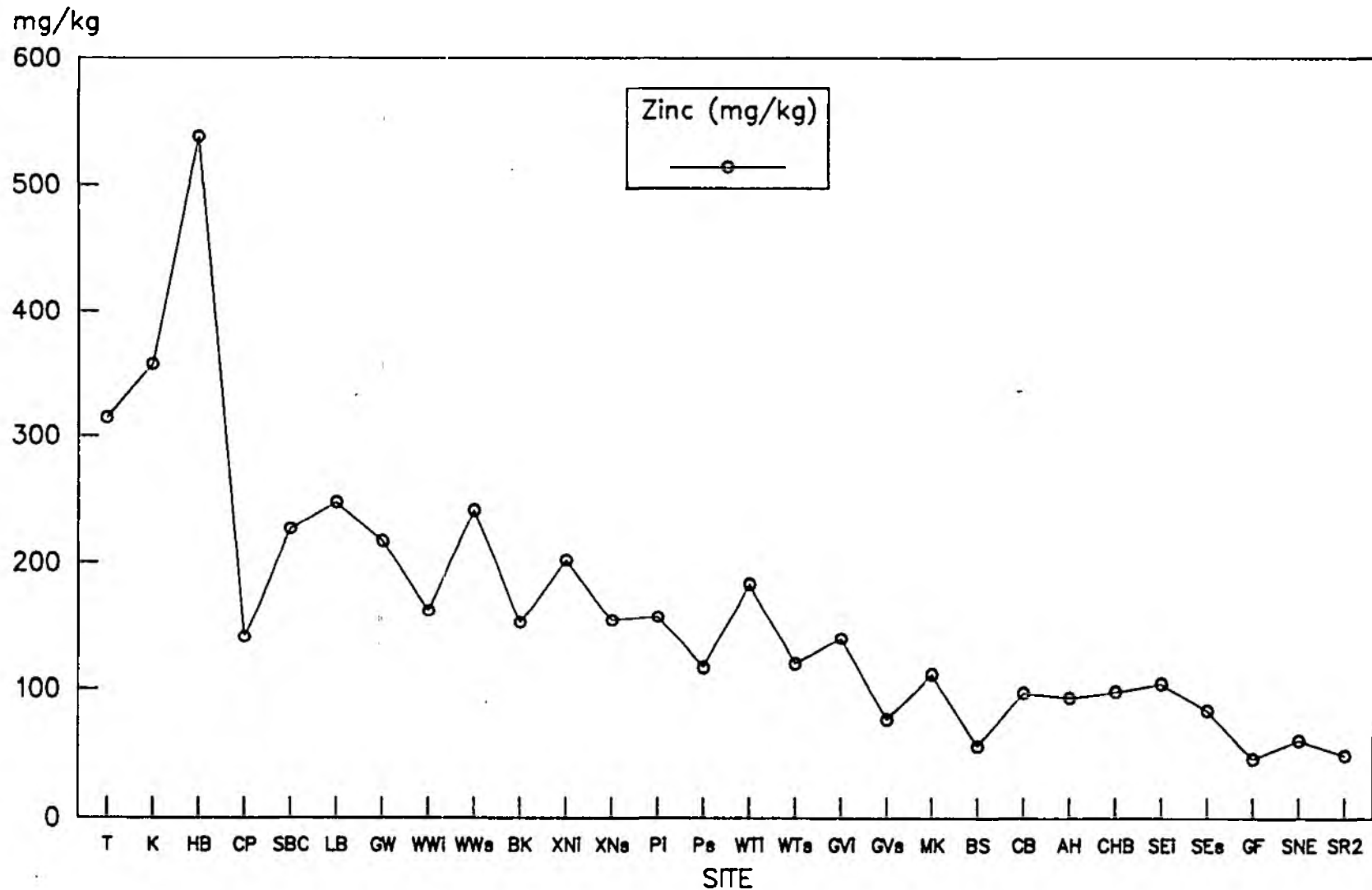
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
LEAD - QUARTER 1/90



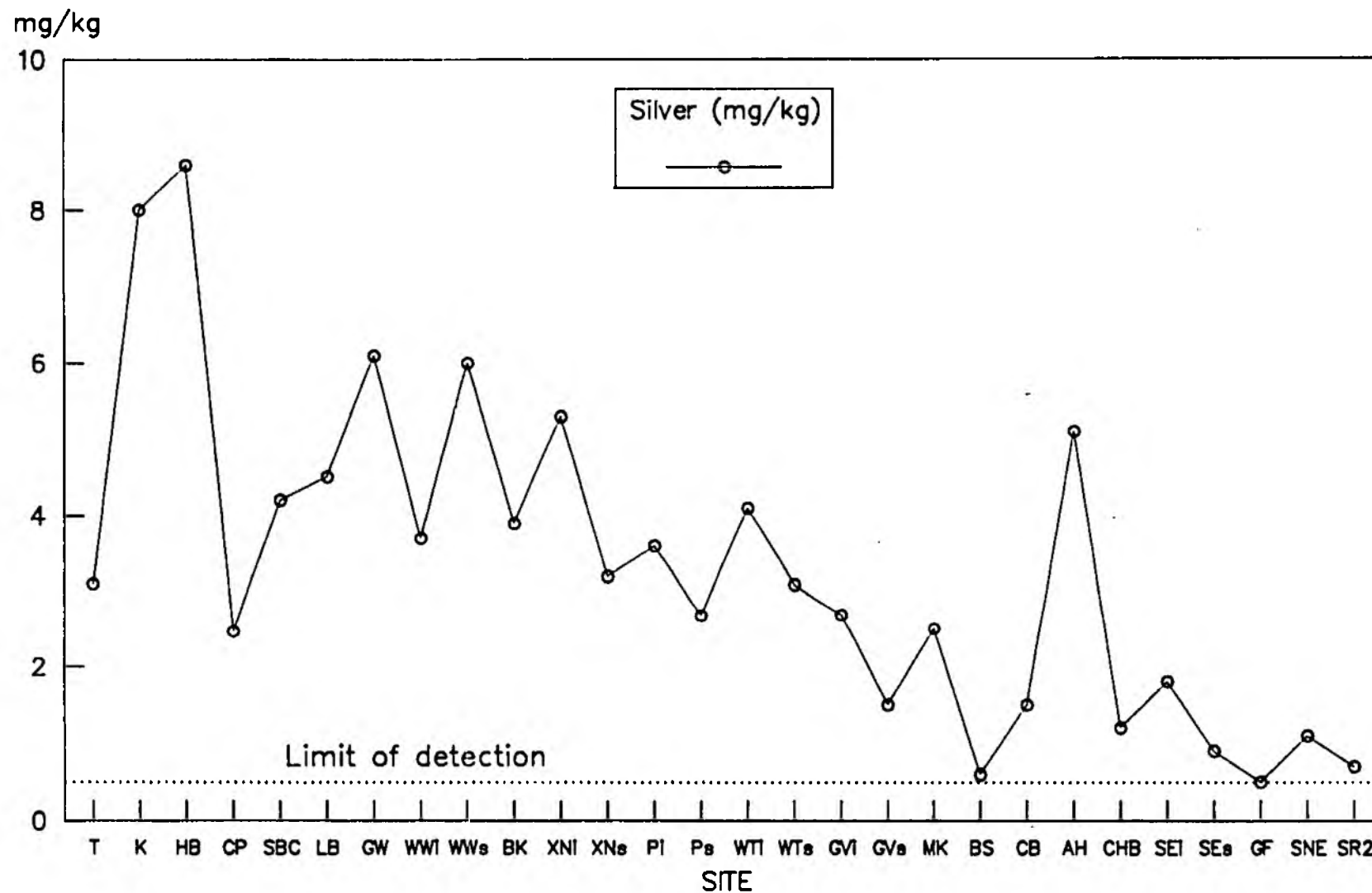
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
NICKEL - QUARTER 1/90



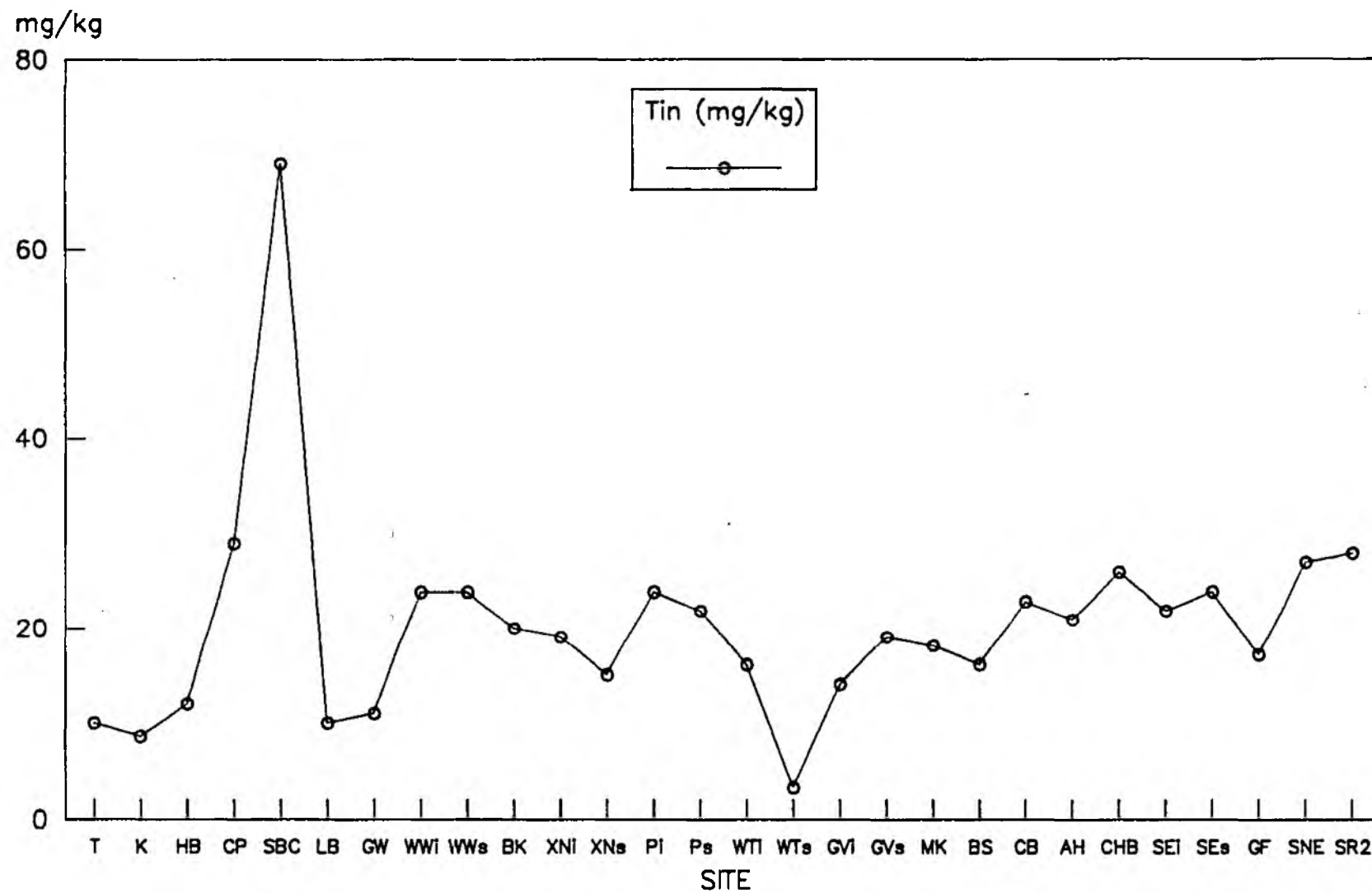
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
ZINC - QUARTER 1/90



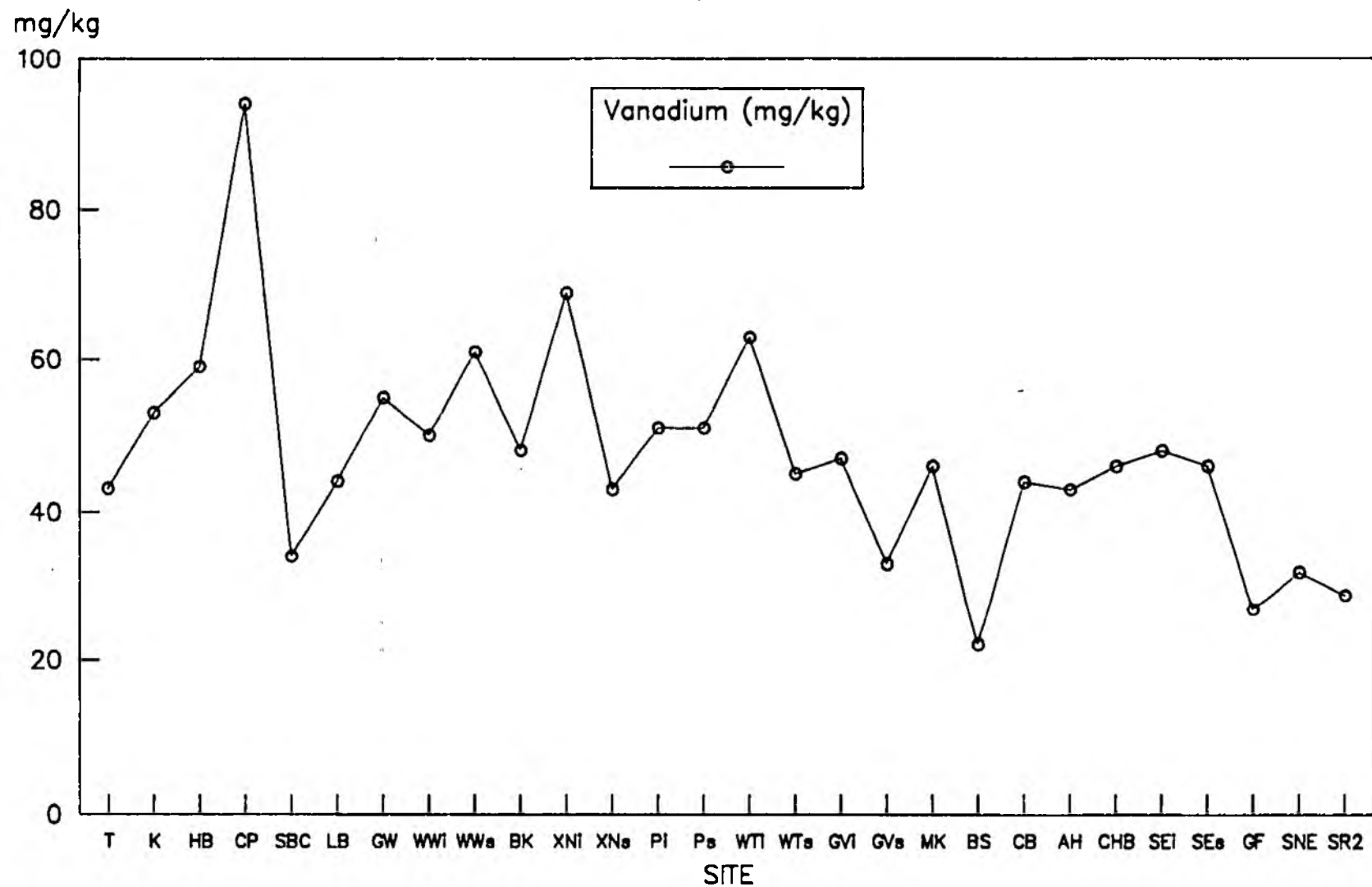
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
SILVER - QUARTER 1/90



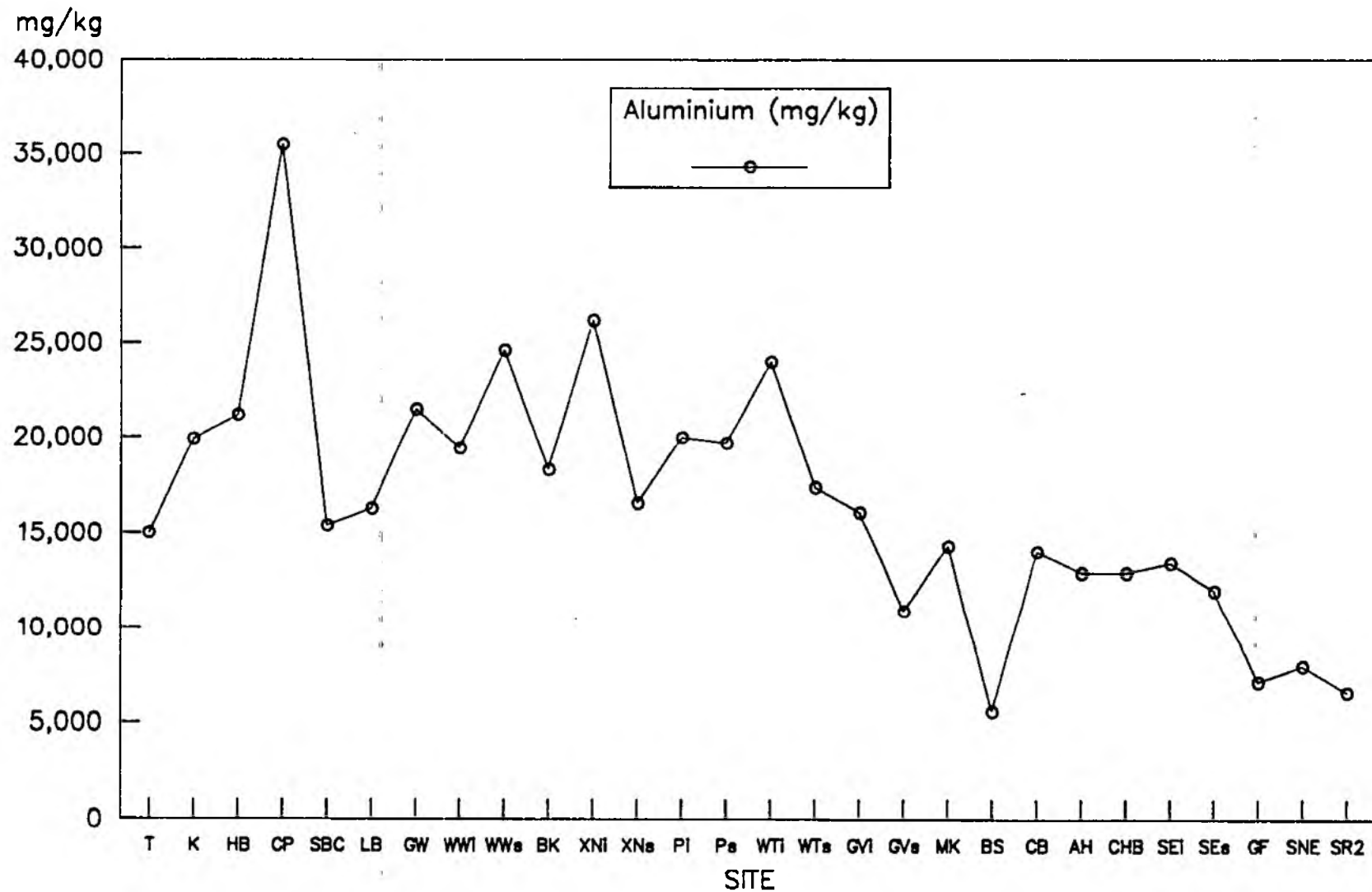
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
TIN - QUARTER 1/90



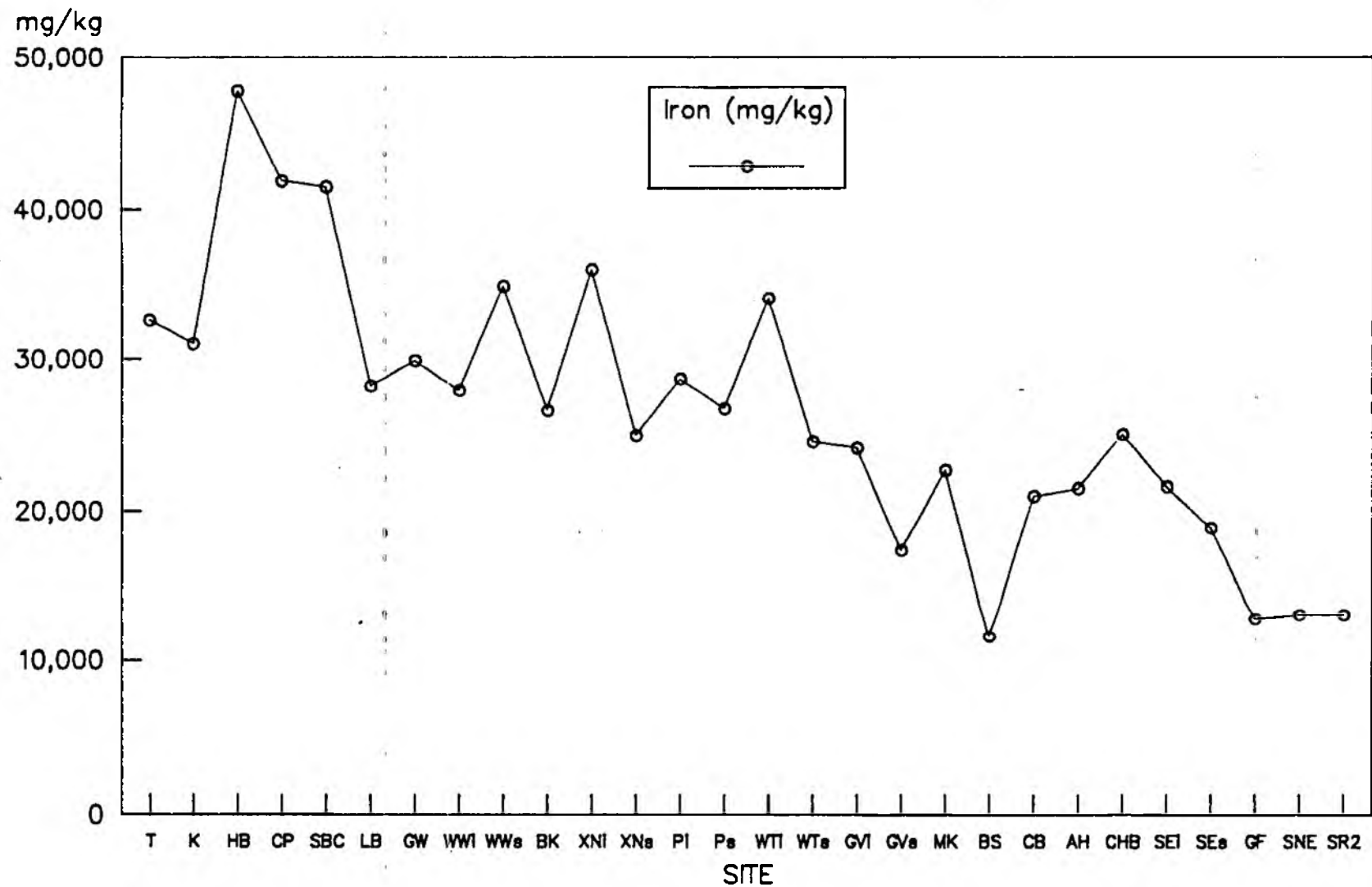
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LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
VANADIUM - QUARTER 1/90



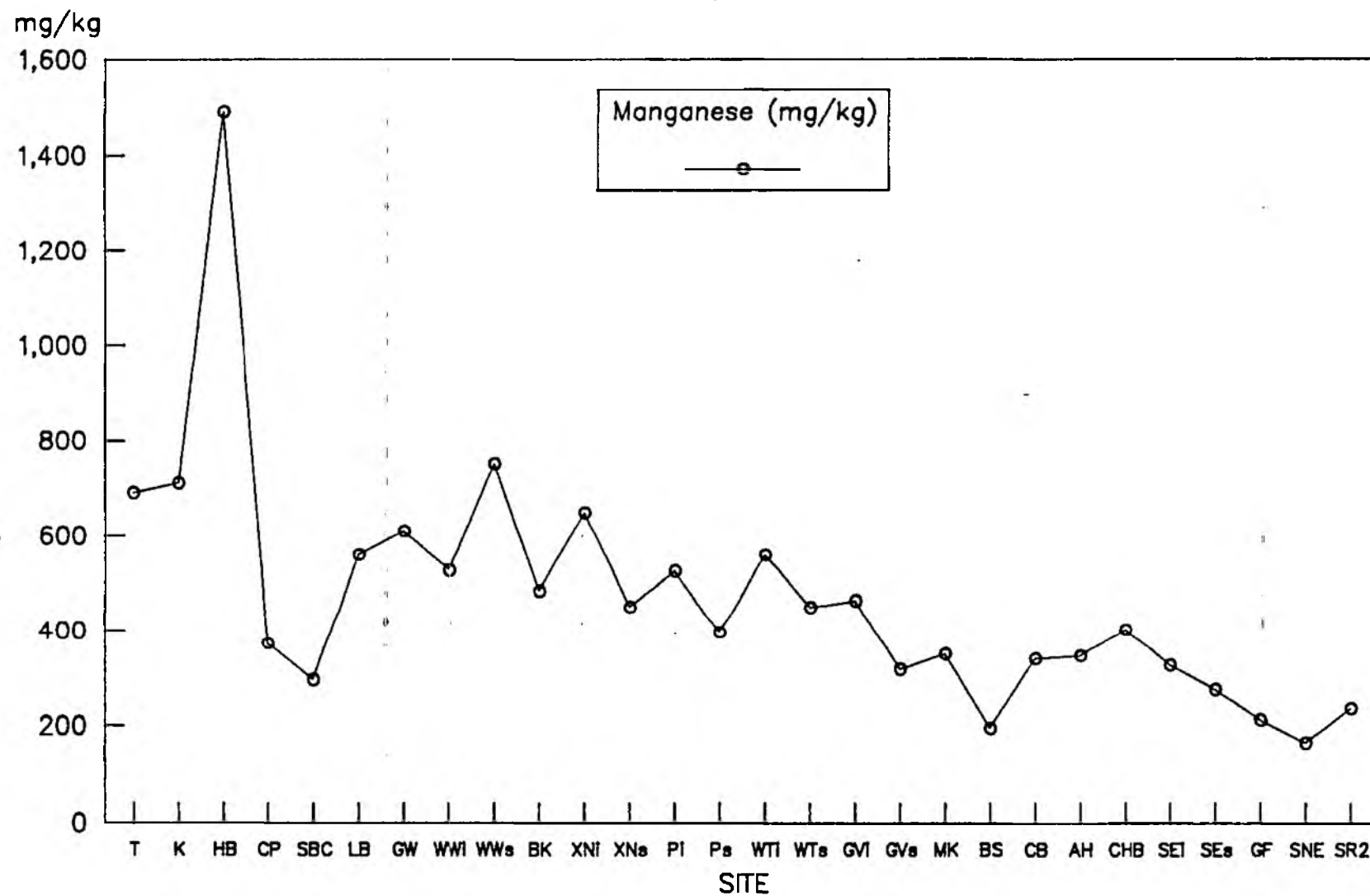
THAMES ESTUARY BENTHIC PROGRAMME
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
ALUMINIUM - QUARTER 1/90



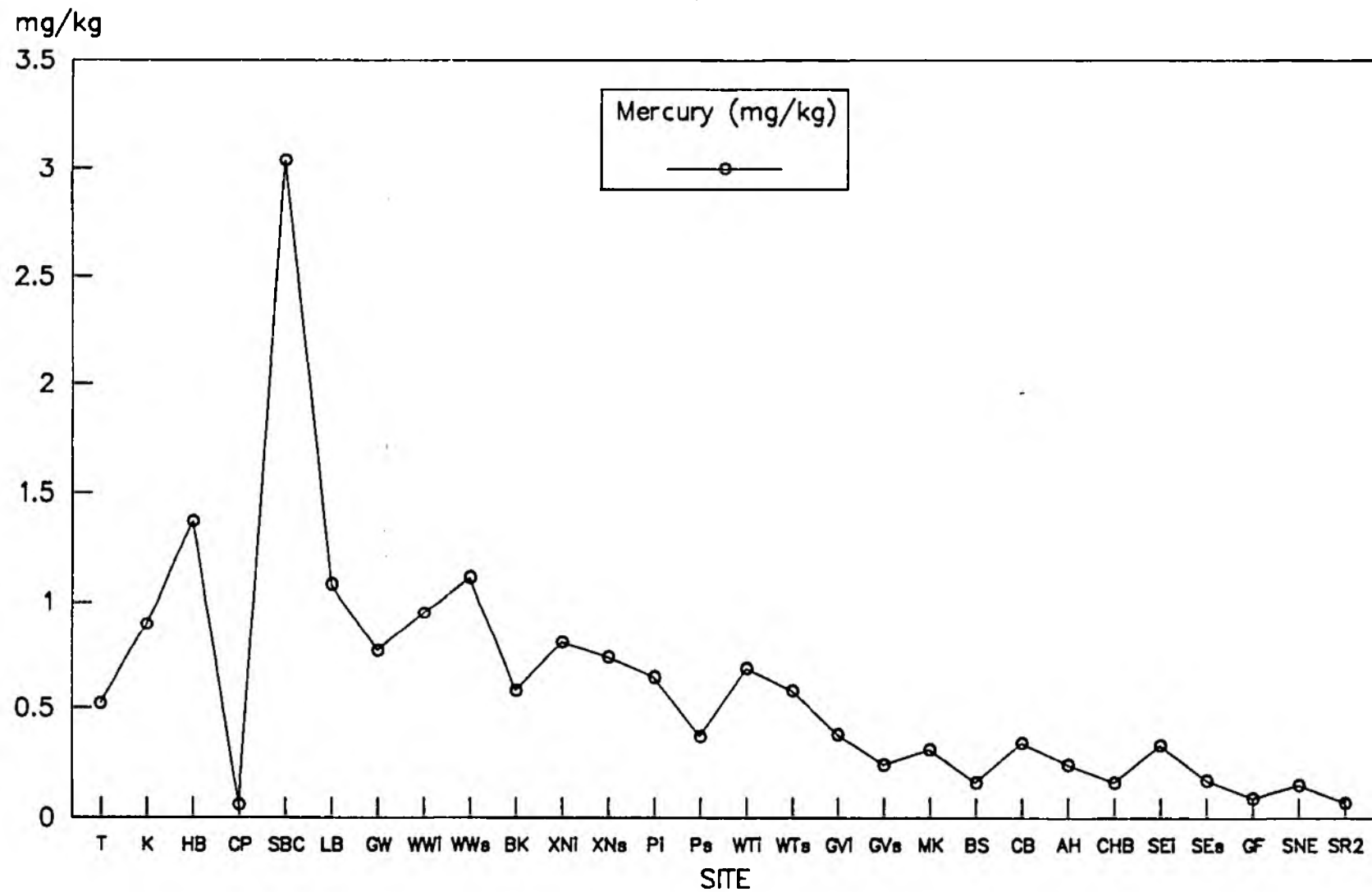
THAMES ESTUARY BENTHIC PROGRAMME
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
IRON - QUARTER 1/90



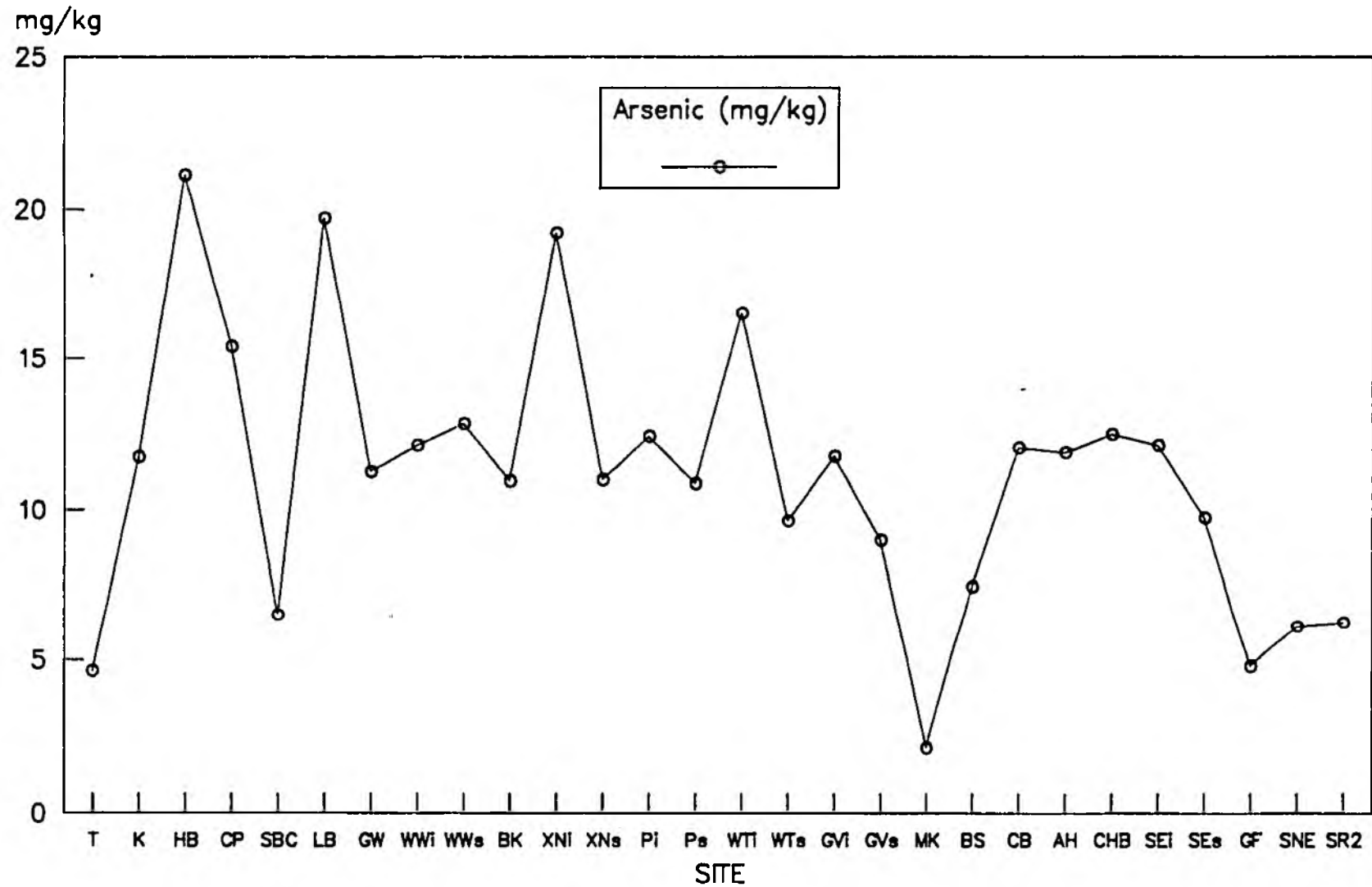
THAMES ESTUARY BENTHIC PROGRAMME
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
MANGANESE - QUARTER 1/90



THAMES ESTUARY BENTHIC PROGRAMME
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
MERCURY - QUARTER 1/90



THAMES ESTUARY BENTHIC PROGRAMME
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
ARSENIC - QUARTER 1/90



SECTION 2: ORGANIC LEVELS

NRA THAMES

MAY 1990

Reporting Limit

Denoted by (

Chlorinated Pesticides (90um (Micrograms/Kilogram)

	Alpha HCH	Hexa Chloro Benzene	Gamma HCH	Delta HCH	Aldrin	p'p DDE	Dieldrin	Endrin	o'p DDT	p'p DDT
	5	5	5	5	5	5	5	5	5	5
MA141 HAMMERSMITH BR	129	38	6	(	9	62	ND	43	(	13380
MA142 KEW	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MA144 TEDDINGTON	(	(	(	(	(	23	ND	(	(	(
MA145 ALLHALLOWS	(	9	(	(	(	16	ND	(	(	(
MA146 GRAVESEND INTERTIDAL	(	20	(	ND	ND	23	ND	(	(	(
MA147 CANVEY BEACH	(	12	(	(	14	40	ND	(	(	(
MA148 GREENWICH	(	(	(	(	(	90	(	(	(	(
MA149 S.BANK CENTRE	(	(	(	(	(	(	(	(	(	(
MA150 SEA REACH No.2	(	(	(	(	(	(	(	(	(	(
MA151 SOUTHEND SUBTIDAL	(	22	(	(	(	(	(	(	(	(
MA152 GRAIN FLATS	(	(	(	(	(	(	(	(	(	(
MA153 CHAPMAN BUOY	(	(	(	(	(	(	(	(	(	(
MA154 BLYTHE SANDS	(	15	(	(	(	(	(	(	(	(
MA156 MUCKING	ND	ND	ND	ND	ND	(	(	(	(	(
MA157 LONDON BR	(	14	(	(	ND	8	ND	(	(	(
MA158 CADOGAN PIER	(	(	(	(	ND	14	ND	(	(	(
MA165 WOOLWICH SUBTIDAL	ND	ND	ND	ND	ND	(	(	(	(	(
MA166 BECKTON	ND	ND	ND	ND	ND	(	(	(	(	(
MA167 CROSSNESS SUBTIDAL	ND	ND	ND	ND	ND	23	ND	(	(	(
MA168 PURFLEET SUBTIDAL	ND	ND	ND	ND	ND	(	(	(	115	(
MA169 W.THURROCK SUBTIDAL	(	(	(	(	(	(	(	(	(	(
MA170 GRAVESEND SUBTIDAL	(	(	(	(	(	(	(	(	(	(
MA176 PURFLEET INTERTIDAL	ND	ND	ND	ND	ND	(	(	22	(	(

NS=NO SAMPLE

ND=NOT DETERMINED DUE TO INTERFERENCE

BB=BROKEN BOTTLE

NR=NOT REQUESTED

* NOT CONFIRMED

NRA THAMES

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MAY 1990

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Reporting Limit

Denoted by <

Chlorinated Pesticides <90um (Micrograms/Kilogram)

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	Alpha HCH	Hexa Chloro Benzene	Gamma HCH	Delta HCH	Aldrin	p'p DDE	Dieldrin	Endrin	o'p DDT	p'p DDT
	5	5	5	5	5	5	5	5	5	5
MA177 W.THURROCK INTERTIDAL<		ND	<	<	<	<	<	<	<	<
MA178 SHOEBOURNE EAST	<	<	<	<	<	<	<	<	<	<
MA179 SOUTHEAST INTERTIDAL	ND	ND	ND	ND	ND	<	<	<	17	<
MA180 WOOLWICH INTERTIDAL	ND	ND	ND	ND	ND	<	<	<	<	<
MA181 CROSSNESS INTERTIDAL	ND	ND	ND	ND	ND	<	<	<	<	<

NRA THAMES

Chlorinated Pesticides <90um (Micrograms/Kilogram)

MAY 1990

Reporting Limit

Denoted by (

PCB 28 PCB 52 PCB 101 PCB 118 PCB 138 PCB 153 PCB 180

10 10 10 10 10 10 10

MA141 HAMMERSMITH BR 15 ((((5 (

MA142 KEW ND ND ND ND ND ND ND

MA144 TEDDINGTON (10 (((((

MA145 ALLHALLOWS (19 (((((

MA146 GRAVESEND INTERTIDAL ND ND (((((

MA147 CANVEY BEACH (16 (((((

MA148 GREENWICH (((((((

MA149 S.BANK CENTRE (((((((

MA150 SEA REACH No.2 (((((((

MA151 SOUTHEND SUBTIDAL (((((((

MA152 GRAIN FLATS (((((((

MA153 CHAPMAN BUOY (((((((

MA154 BLYTHE SANDS ND ND 41 (((((

MA156 MUCKING (((((((

MA157 LONDON BR (((((((

MA158 CADOGAN PIER ND ND (((((

MA165 WOOLWICH SUBTIDAL ND ND (((((

MA166 BECKTON ND ND (((((

MA167 CROSSNESS SUBTIDAL ND ((((((

MA168 PURFLEET SUBTIDAL ND ND (((((

MA169 W.THURROCK SUBTIDAL (((((((

MA170 GRAVESEND SUBTIDAL (((((((

MA176 PURFLEET INTERTIDAL ND ND 163 (((((

NS=NO SAMPLE ND=NOT DETERMINED DUE TO INTERFERENCE BB=BROKEN BOTTLE NR=NOT REQUESTED

NRA THAMES

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Chlorinated Pesticides (90um (Micrograms/Kilogram)

=====

MAY 1990

PCB	PCB	PCB	PCB	PCB	PCB	PCB
28	52	101	118	138	153	180

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Reporting Limit

10	10	10	10	10	10	10
----	----	----	----	----	----	----

Denoted by <

MA177 W.THURROCK INTERTIDALND

ND	<	<	<	<	<	<
----	---	---	---	---	---	---

MA178 SHOEBOURNE EAST

<	7	<	<	<	<	<
---	---	---	---	---	---	---

MA179 SOUTHEAST INTERTIDAL

ND	ND	17	16	<	<	<
----	----	----	----	---	---	---

MA180 WOOLWICH INTERTIDAL

ND	ND	13	<	<	<	<
----	----	----	---	---	---	---

MA181 CROSSNESS INTERTIDAL

ND	ND	<	<	<	<	<
----	----	---	---	---	---	---

NRA THAMES

MAY 1990

Reporting Limit

Denoted by (

Chlorinated Pesticides >90um (Micrograms/Kilogram)

	Alpha HCH	Hexa Chloro Benzene	Gamma HCH	Delta HCH	Aldrin	p'p DDE	Dieldrin	Endrin	o'p DDT	p'p DDT
	5	5	5	5	5	5	5	5	5	5
MA141 HAMMERSMITH BR	12	(	(	(	(	10	ND	(	(	(
MA142 KEW	(	(	(	(	(	9	ND	(	(	(
MA144 TEDDINGTON	(	(	(	(	(	(	(	(	(	(
MA145 ALLHALLOWS	(	(	(	(	(	(	(	(	(	(
MA146 GRAVESEND INTERTIDAL	ND	ND	ND	(	ND	ND	ND	ND	ND	ND
MA147 CANVEY BEACH	(	(	(	(	(	(	(	(	(	(
MA148 GREENWICH	(	(	(	(	(	15	ND	(	(	38
MA149 S.BANK CENTRE	(	(	(	(	(	5	(	(	(	(
MA150 SEA REACH No.2	(	(	(	(	(	7	(	(	(	(
MA151 SOUTHEAST SUBTIDAL	(	(	(	(	(	7	(	(	(	(
MA152 GRAIN FLATS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MA153 CHAPMAN BUOY	(	(	(	(	(	(	(	(	(	(
MA154 BLYTHE SANDS	(	(	(	(	(	34	ND	(	(	(
MA156 MUCKING	ND	ND	ND	ND	ND	(	(	(	(	(
MA157 LONDON BR	ND	ND	ND	ND	ND	ND	ND	ND	(	ND
MA158 CADOGAN PIER	ND	ND	ND	ND	ND	ND	ND	ND	(	ND
MA165 WOOLWICH SUBTIDAL	ND	ND	ND	ND	ND	(	(	(	(	(
MA166 BECKTON	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MA167 CROSSNESS SUBTIDAL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MA168 PURFLEET SUBTIDAL	ND	ND	ND	ND	ND	ND	ND	ND	ND	(
MA169 W.THURROCK SUBTIDAL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MA170 GRAVESEND SUBTIDAL	(	10	(	(	(	14	ND	(	(	(
MA176 PURFLEET INTERTIDAL	ND	ND	ND	ND	ND	24	ND	(	(	(

NS=NO SAMPLE ND=NOT DETERMINED DUE TO INTERFERENCE BB=BROKEN BOTTLE NR=NOT REQUESTED

NRA THAMES

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MAY 1990

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Reporting Limit

Denoted by <

Chlorinated Pesticides >90um (Micrograms/Kilogram)

=====

	Alpha HCH	Hexa Chloro Benzene	Gamma HCH	Delta HCH	Aldrin	p'p DDE	Dieldrin	Endrin	o'p DDT	p'p DDT
	5	5	5	5	5	5	5	5	5	5
MA177 W.THURROCK INTERTIDAL	<	<	<	<	<	11	ND	<	<	<
MA178 SHOEBOURNE EAST	<	<	<	<	<	13	ND	<	<	<
MA179 SOUTHEAST INTERTIDAL	<	<	<	<	<	17	ND	<	<	<
MA180 WOOLWICH INTERTIDAL	<	<	<	<	<	25	ND	<	<	<
MA181 CROSSNESS INTERTIDAL	<	<	<	<	<	6	ND	<	<	<

NRA THAMES

Chlorinated Pesticides >90um (Micrograms/Kilogram)

	PCB 28	PCB 52	PCB 101	PCB 118	PCB 138	PCB 153	PCB 180
MAY 1990							
Reporting Limit	10	10	10	10	10	10	10
Denoted by <							
MA141 HAMMERSMITH BR	<	<	18	<	<	<	<
MA142 KEW	<	<	<	<	<	<	<
MA144 TEDDINGTON	<	<	<	<	<	<	<
MA145 ALLHALLOWS	<	<	<	<	<	<	<
MA146 GRAVESEND INTERTIDAL	ND	ND	ND	ND	ND	ND	ND
MA147 CANVEY BEACH	<	<	<	<	<	<	<
MA148 GREENWICH	<	<	21	<	<	<	<
MA149 S.BANK CENTRE	<	<	<	<	<	<	<
MA150 SEA REACH No.2	<	<	<	<	<	<	<
MA151 SOUTHEND SUBTIDAL	<	<	<	<	<	<	<
MA152 GRAIN FLATS	ND	ND	ND	ND	ND	ND	ND
MA153 CHAPMAN BUOY	<	<	<	<	<	<	<
MA154 BLYTHE SANDS	12	ND	11	<	<	<	<
MA156 MUCKING	ND	ND	<10	<	<	<	<
MA157 LONDON BR	ND	ND	ND	ND	ND	ND	ND
MA158 CADOGAN PIER	ND	ND	ND	ND	ND	ND	ND
MA165 WOOLWICH SUBTIDAL	ND	ND	<	<	<	<	<
MA166 BECKTON	ND	ND	ND	ND	ND	ND	ND
MA167 CROSSNESS SUBTIDAL	ND	ND	ND	ND	ND	ND	ND
MA168 PURFLEET SUBTIDAL	ND	ND	ND	ND	ND	ND	ND
MA169 W.THURROCK SUBTIDAL	ND	ND	ND	ND	ND	ND	ND
MA170 GRAVESEND SUBTIDAL	<	<	28	<	17	<	<
MA176 PURFLEET INTERTIDAL	ND	ND	<	<	<	<	<

NS=NO SAMPLE ND=NOT DETERMINED DUE TO INTERFERENCE BB=BROKEN BOTTLE NR=NOT REQUESTED

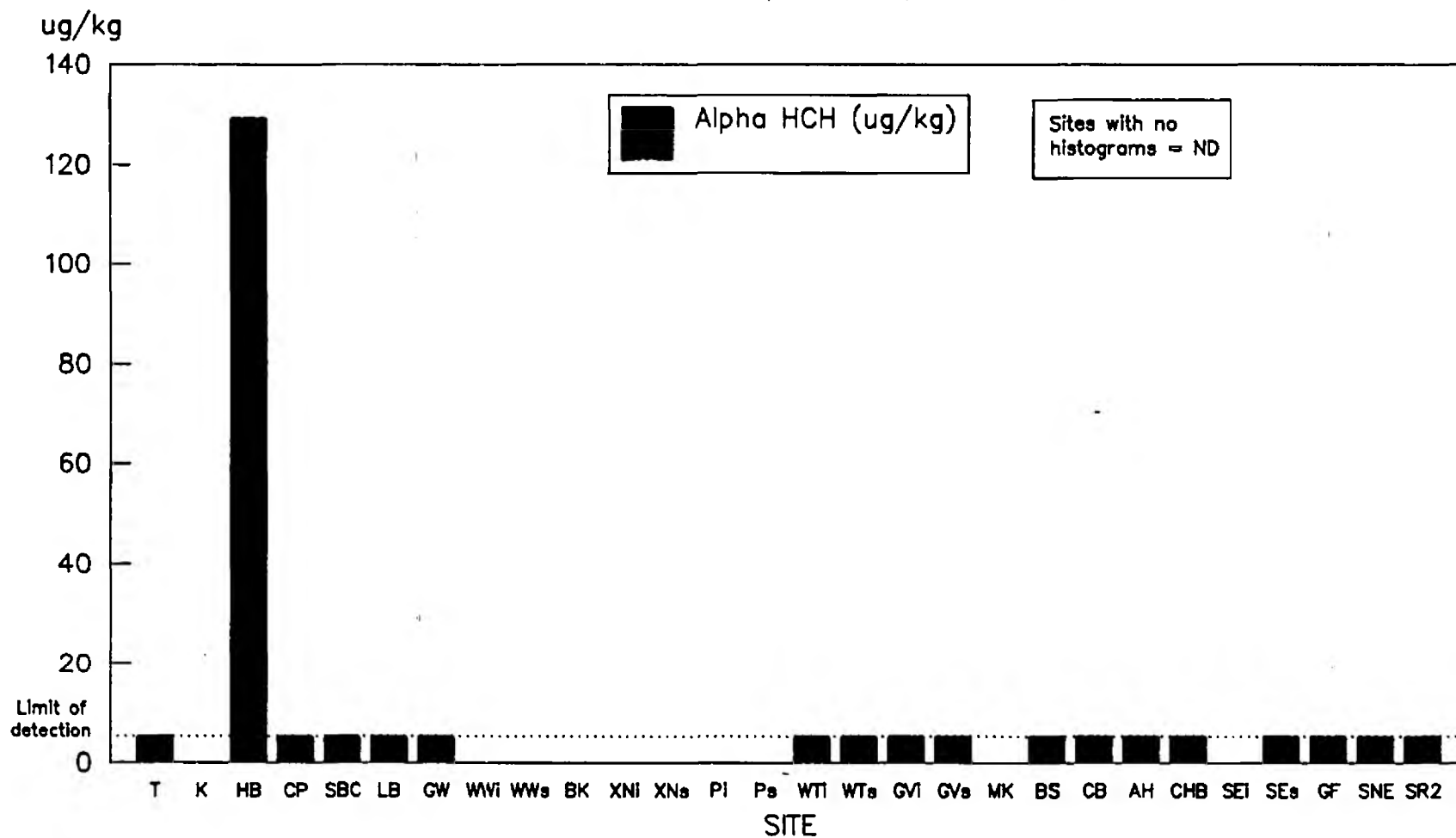
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01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 10

[illegible]

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THAMES ESTUARY BENTHIC PROGRAMME LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm) ALPHA HCH - QUARTER 1/90

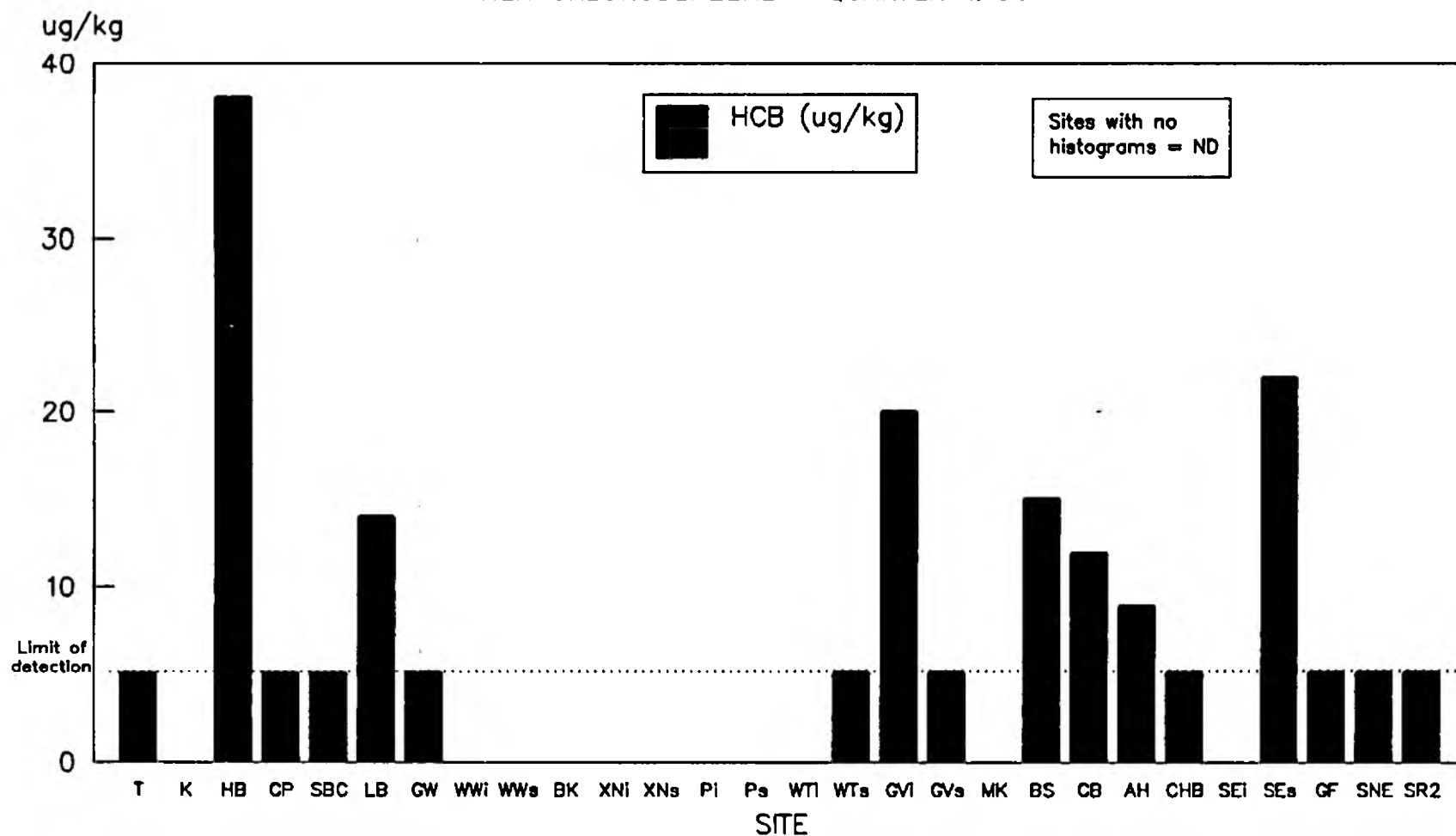


Data set discontinuous due to non determination of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME

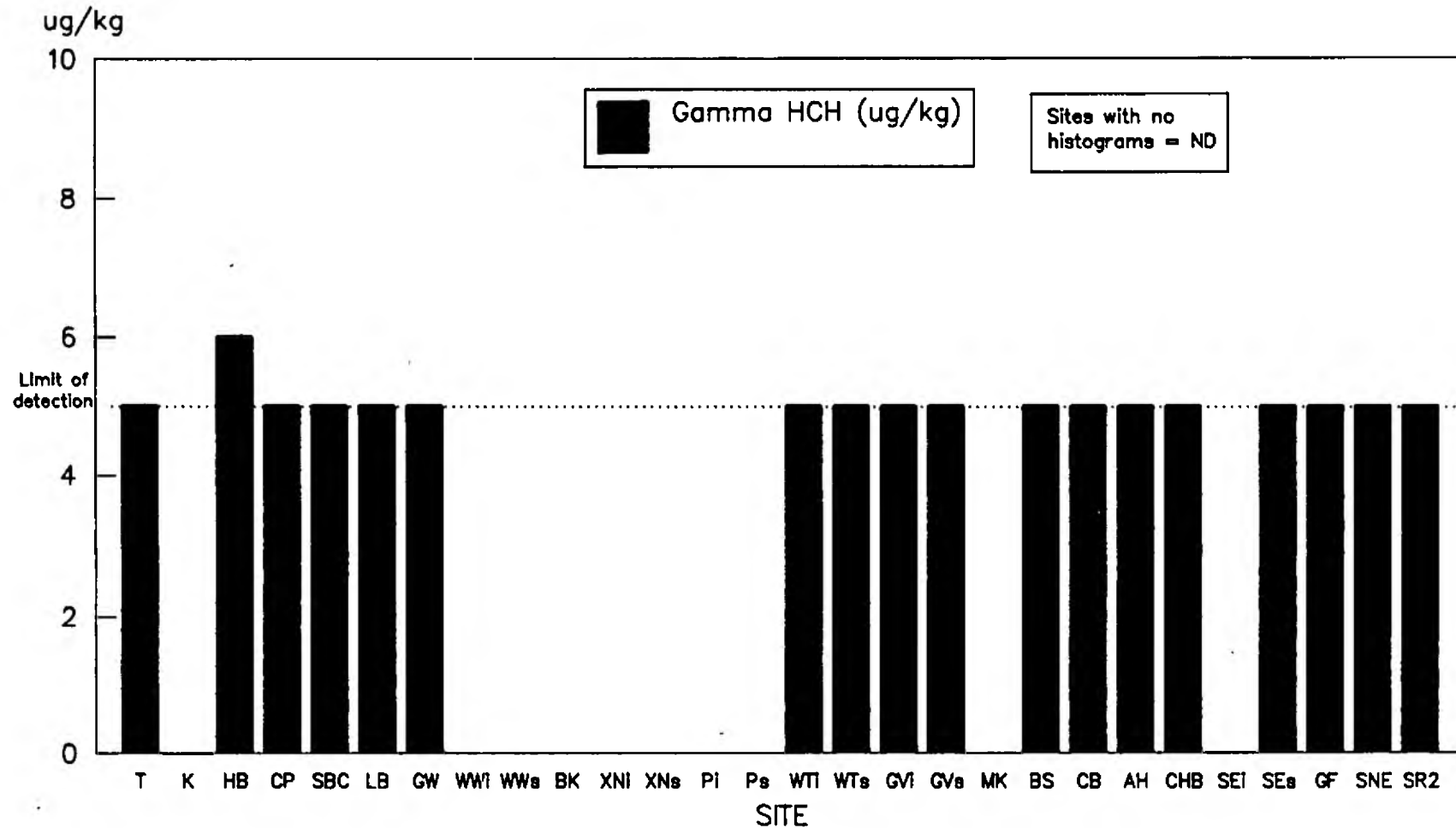
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)

HEXACHLOROBENZENE - QUARTER 1/90



Data set discontinuous due to non determination of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME
 LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
 GAMMA HCH - QUARTER 1/90

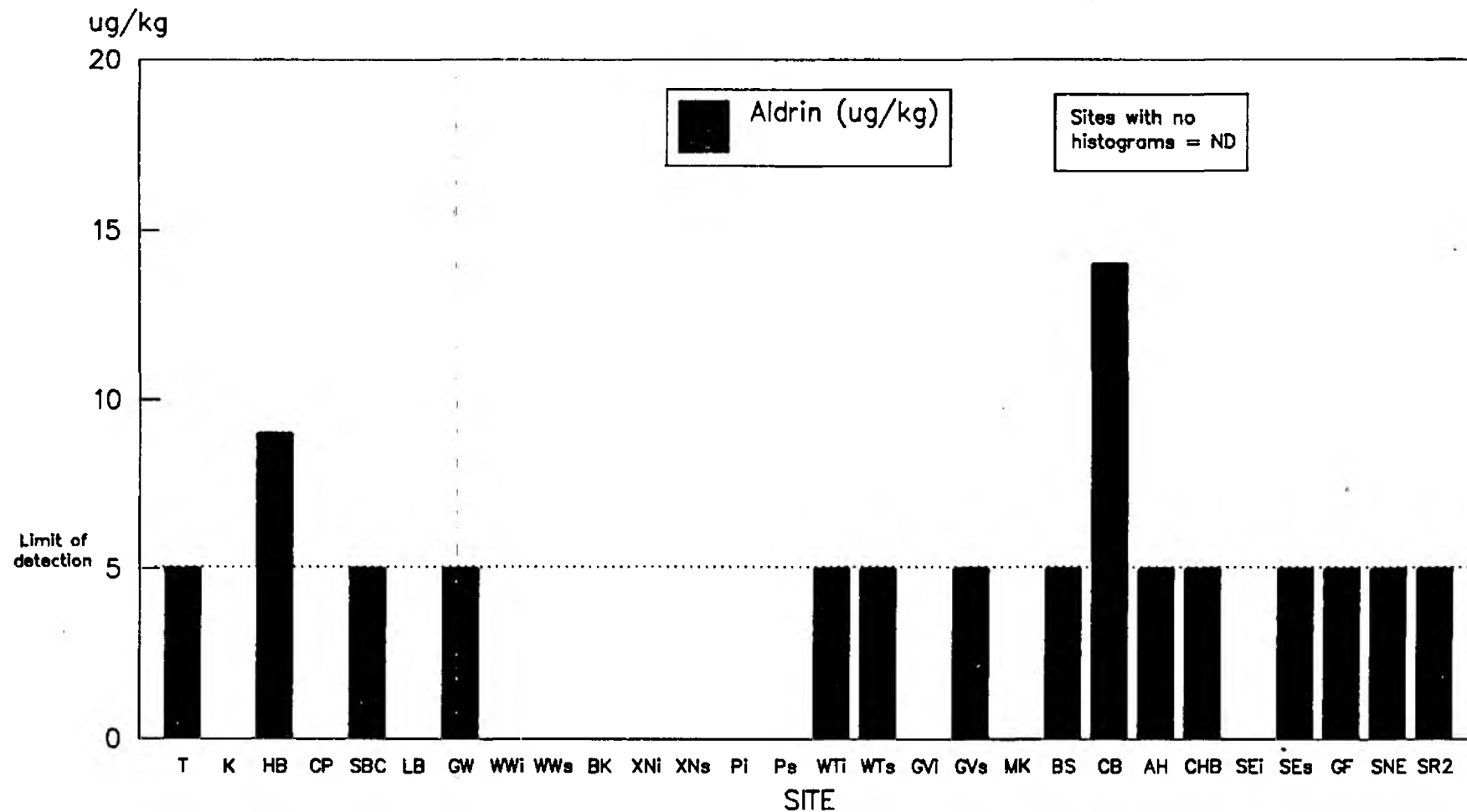


Data set discontinuous due to non determination
 of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME

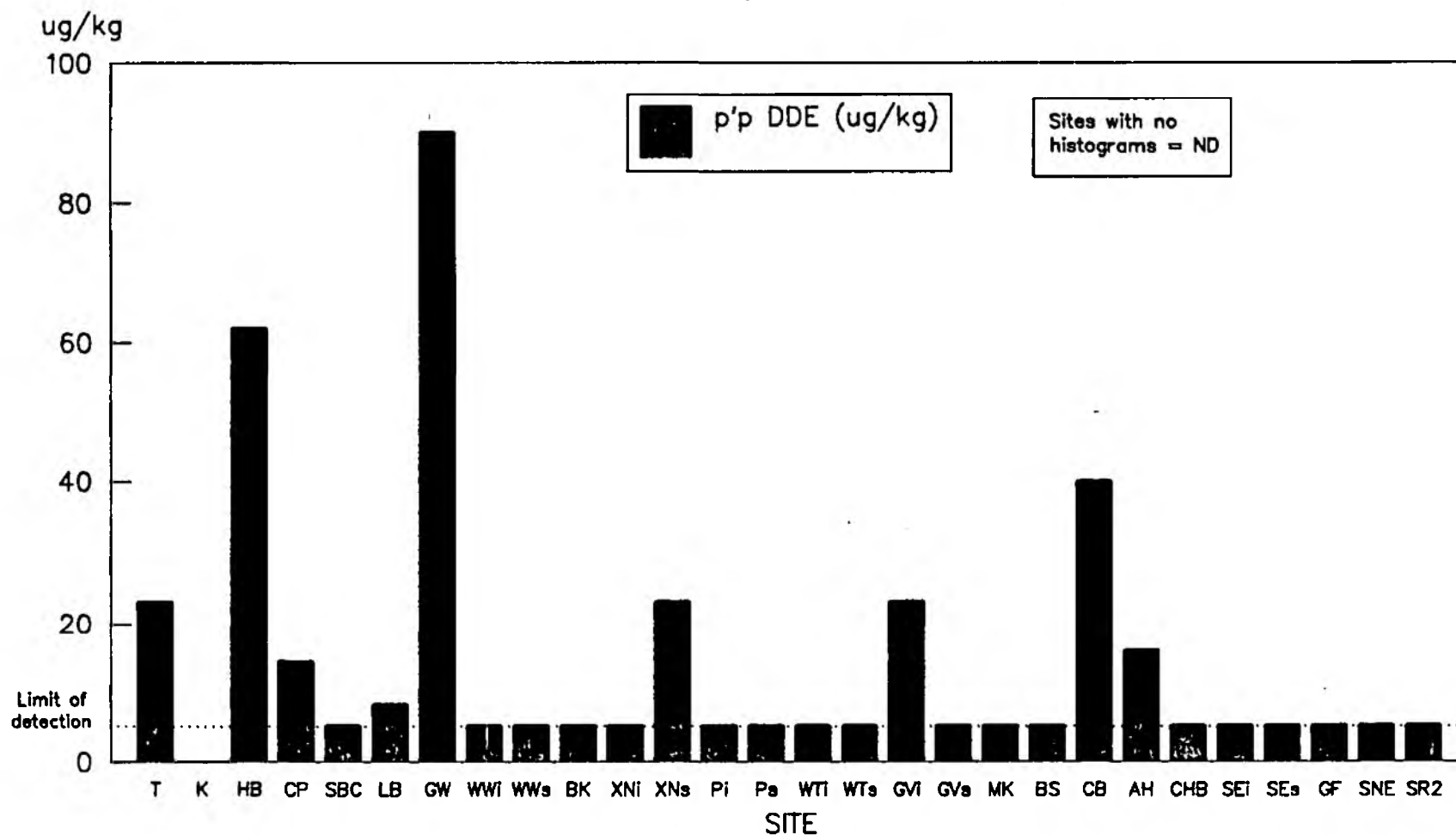
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)

ALDRIN - QUARTER 1/90



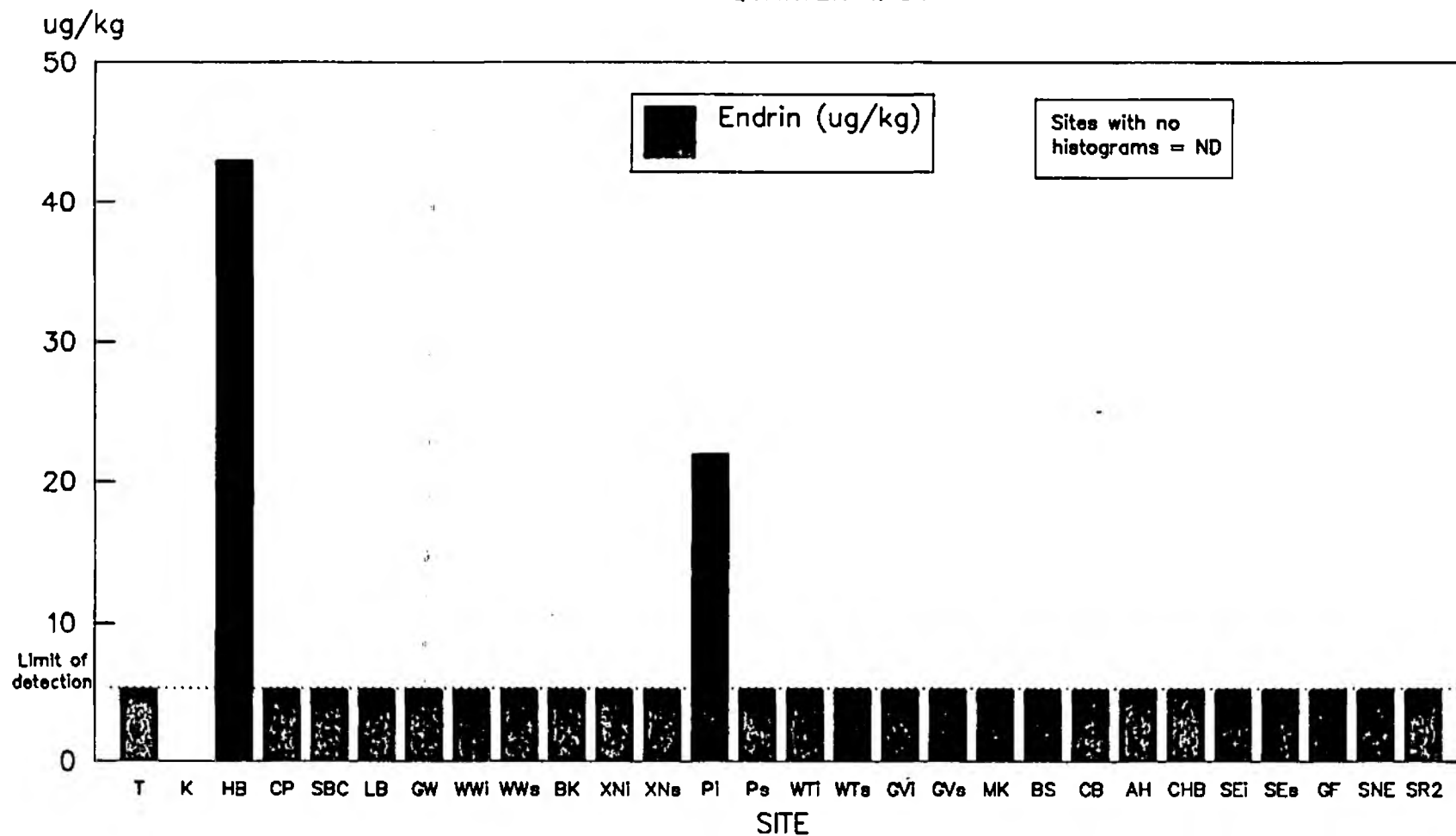
Data set discontinuous due to non determination of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μ m) P'P DDE - QUARTER 1/90



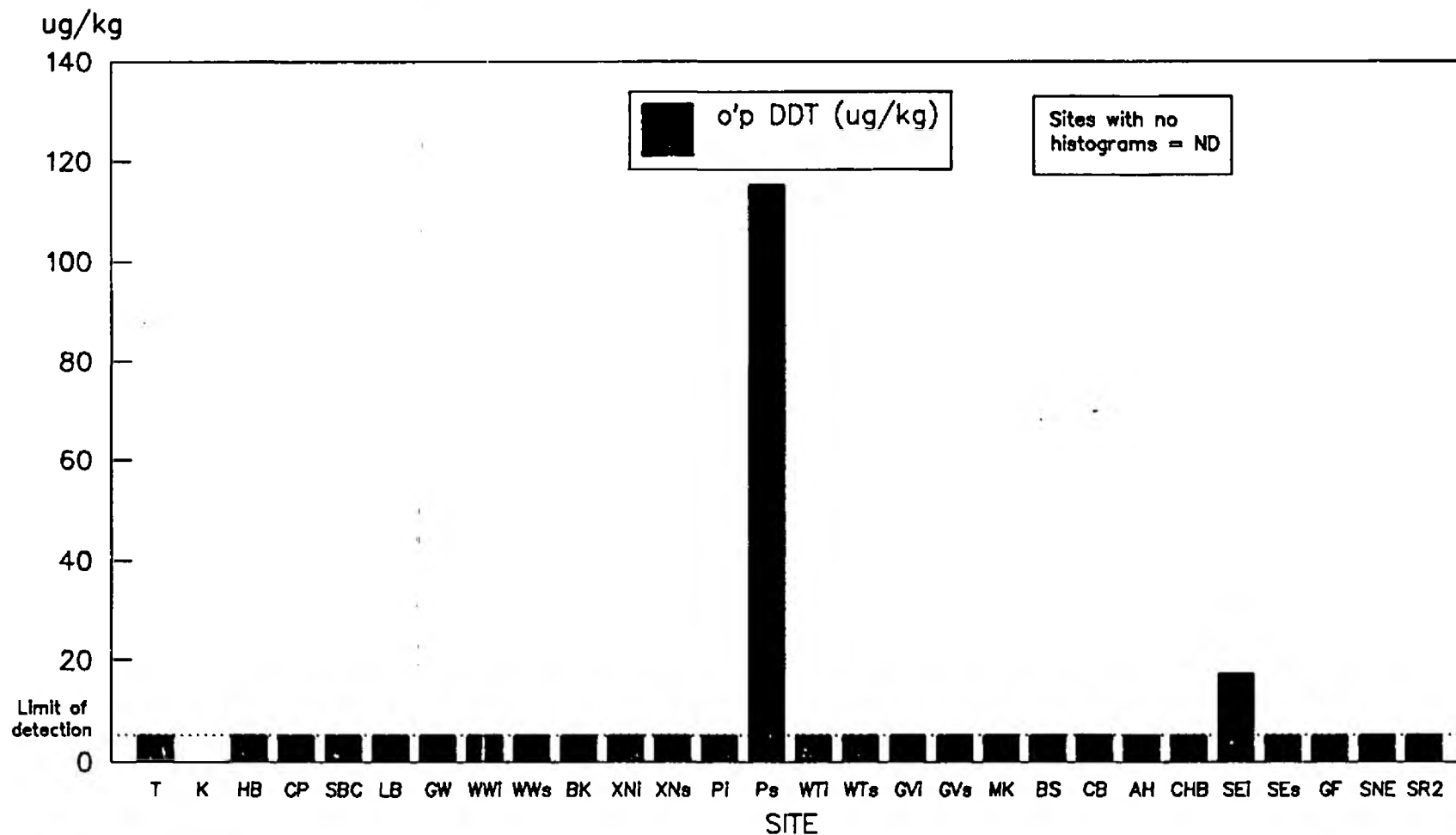
Data set discontinuous due to non determination of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μ m) ENDRIN - QUARTER 1/90



Data set discontinuous due to non determination
 of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μ m) O'P DDT - QUARTER 1/90

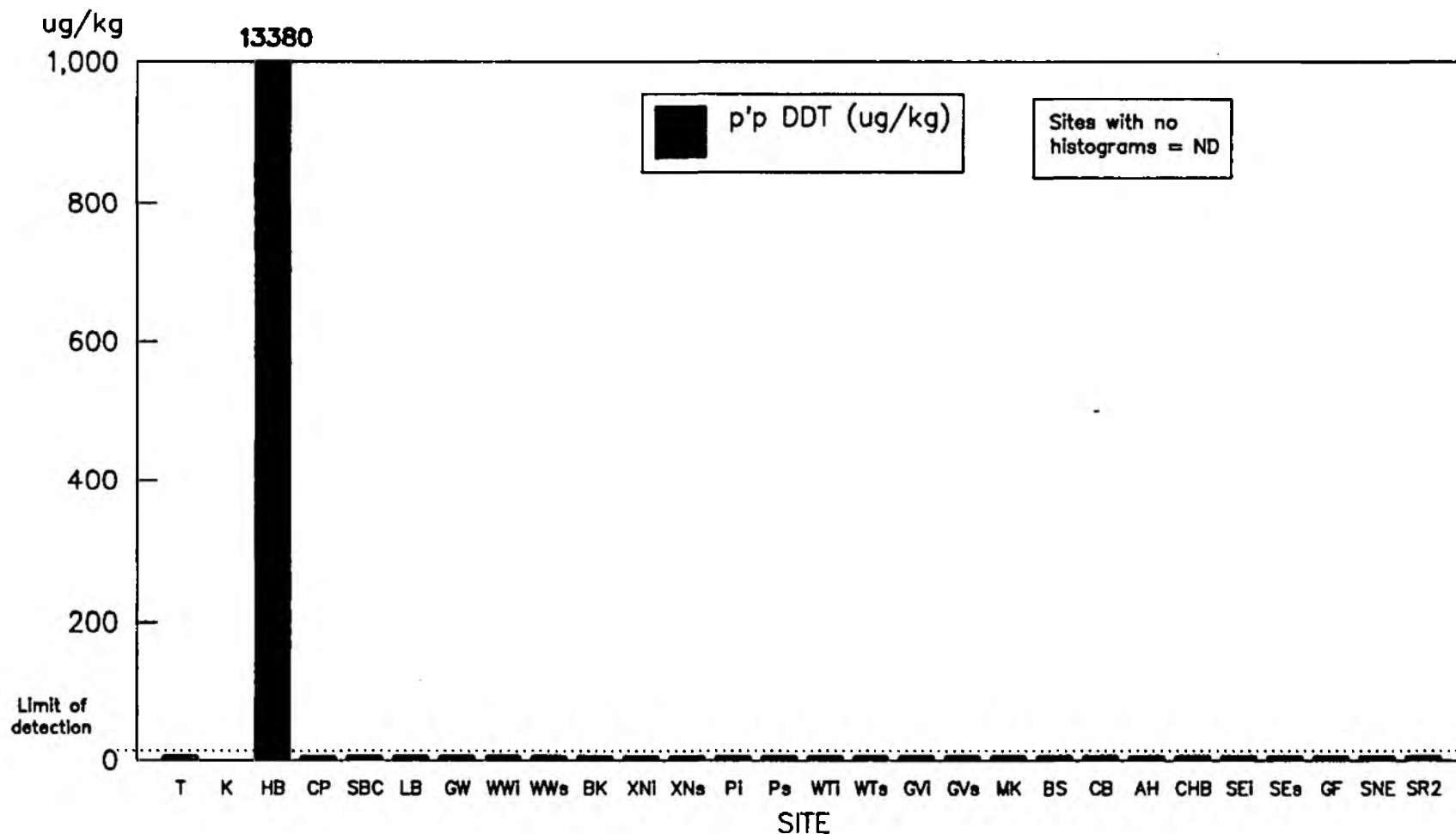


Data set discontinuous due to non determination
 of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME

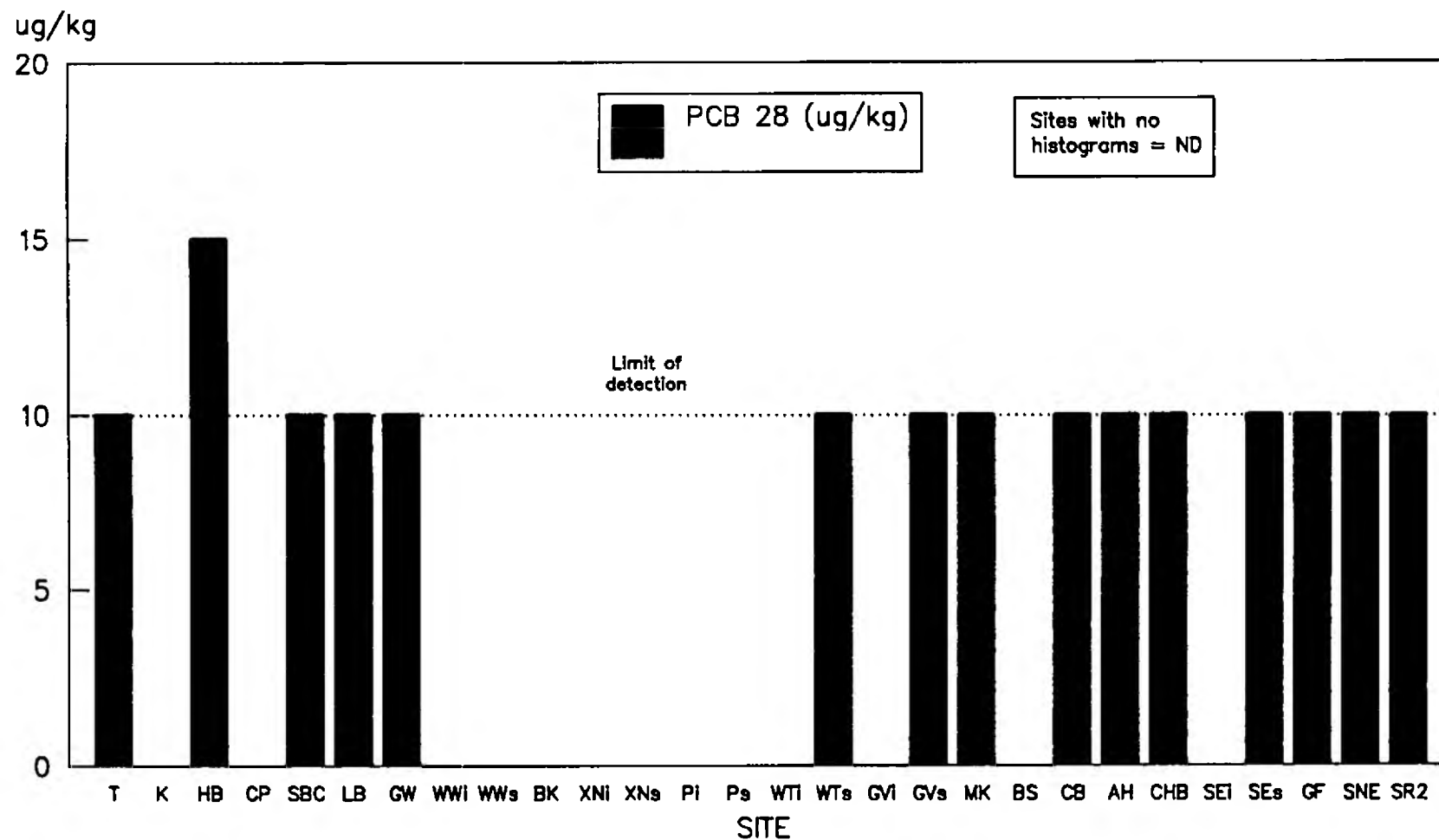
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)

P'P DDT - QUARTER 1/90



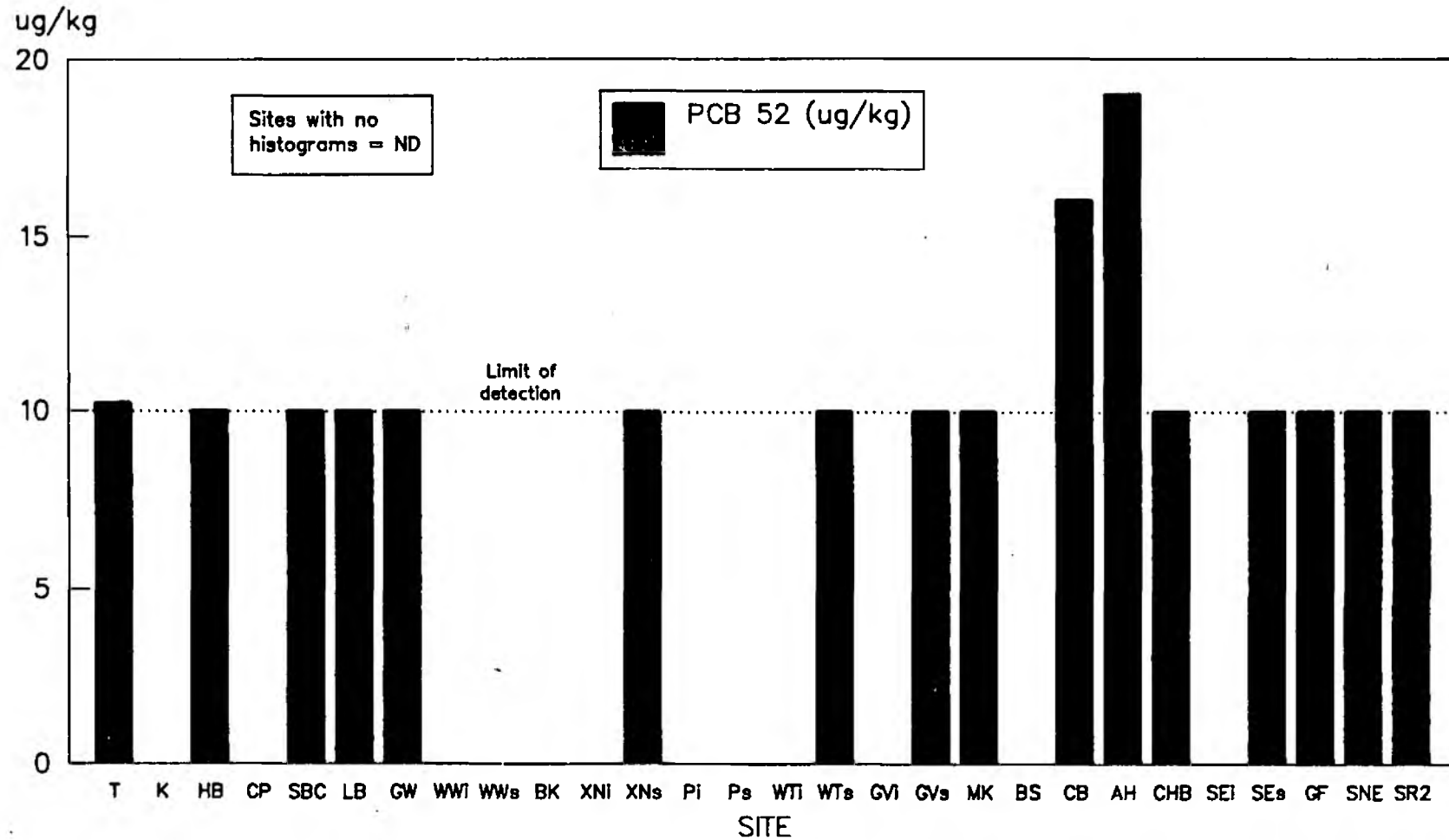
Data set discontinuous due to non determination of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm) PCB 28 - QUARTER 1/90



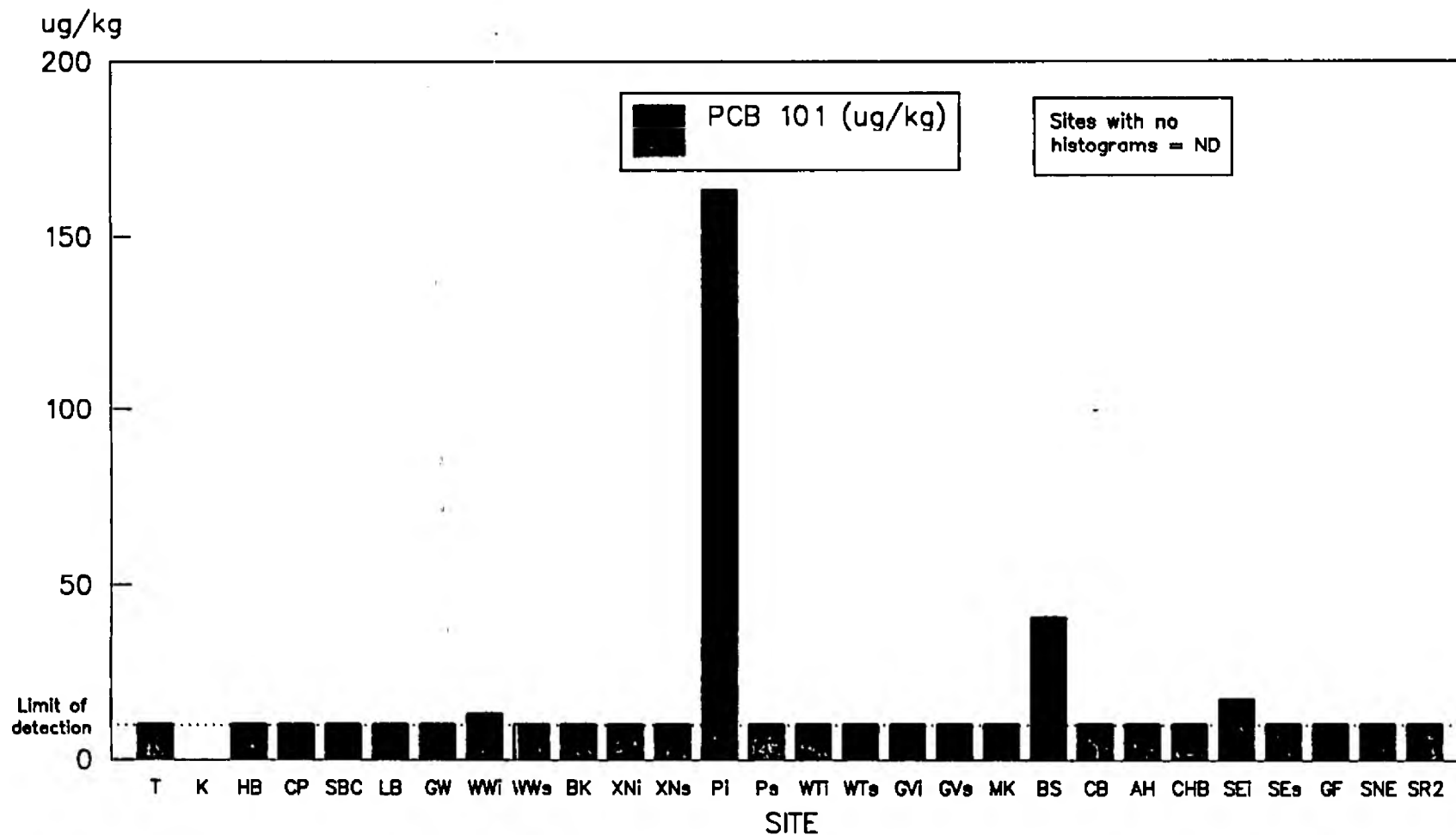
Data set discontinuous due to non determination of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME
LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
PCB 52 - QUARTER 1/90



Data set discontinuous due to non determination
of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME
 LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)
 PCB 101 - QUARTER 1/90

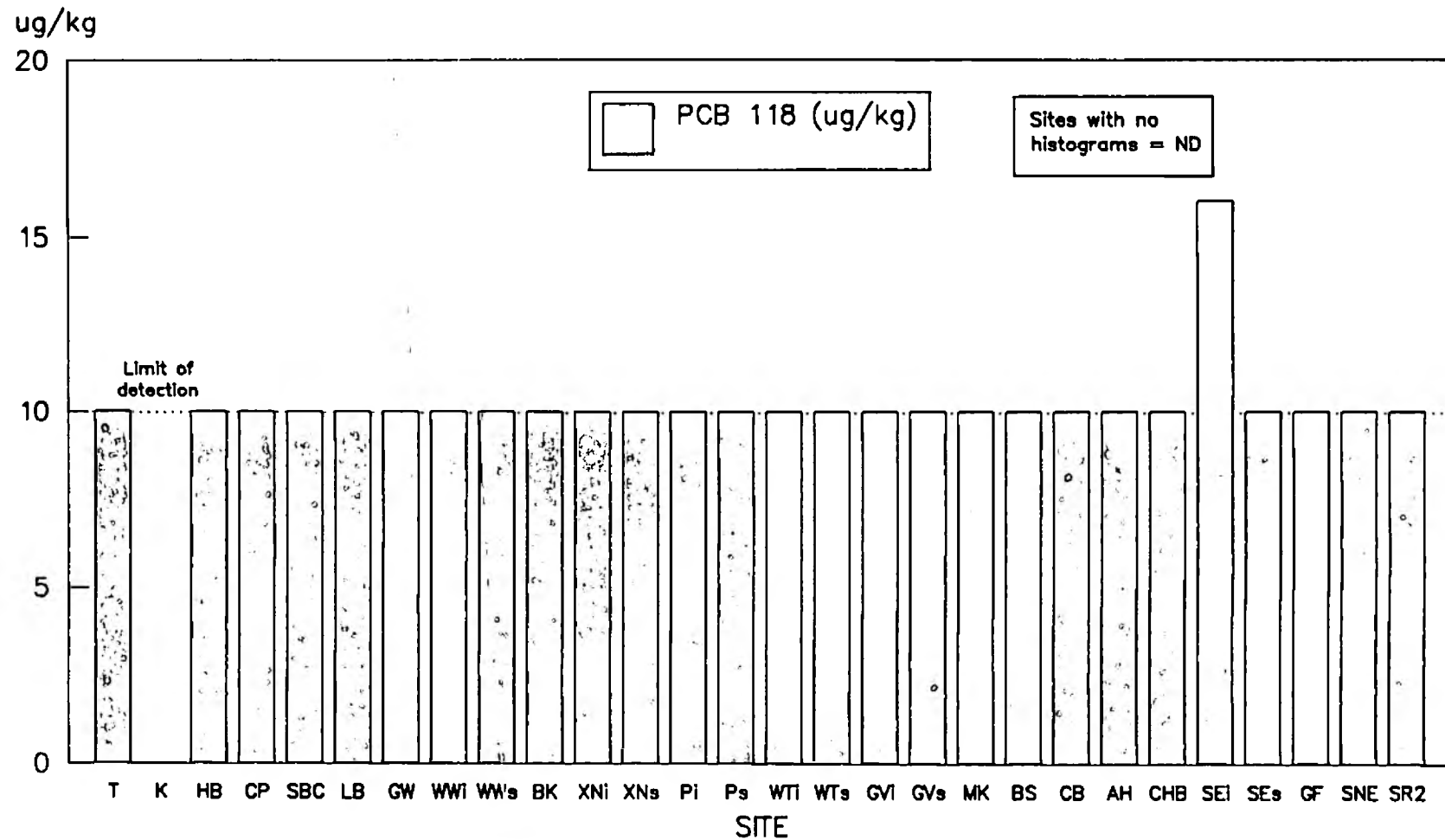


Data set discontinuous due to non determination
 of some samples due to interference (ND)

THAMES ESTUARY BENTHIC PROGRAMME

LEVELS OF CONTAMINANTS IN THE SEDIMENT (<90 μm)

PCB 118 - QUARTER 1/90



Data set discontinuous due to non determination of some samples due to interference (ND)