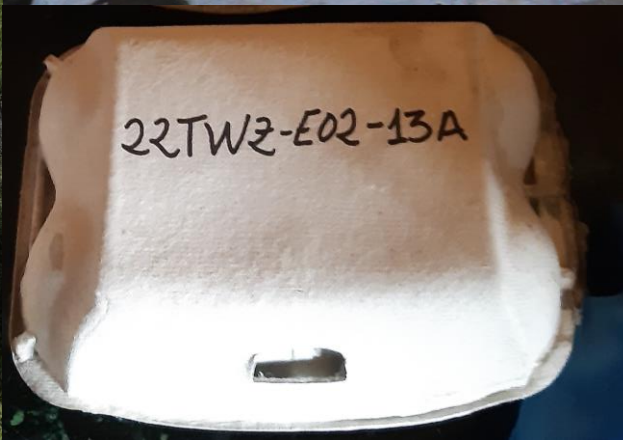
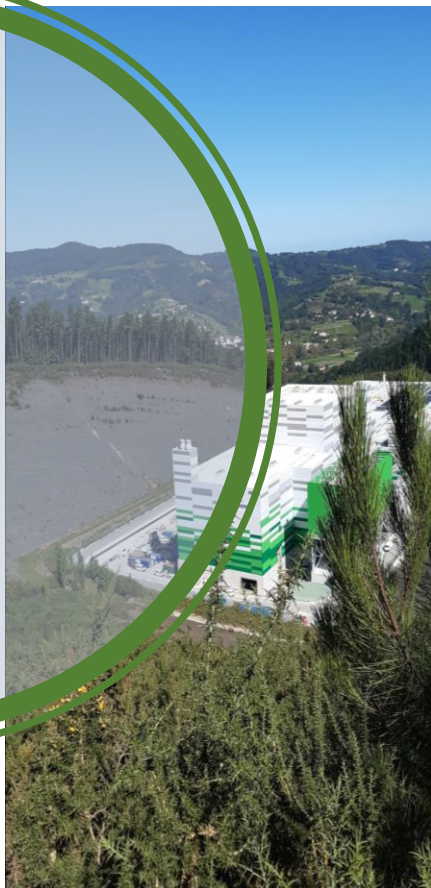


# Biomonitoring research Zubieta 2022

Gipuzkoa Basque Country

Eggs  
Sediment  
Water  
Soil  
Mosses



Biomonitoring Zubieta 2022											
Sample	Date	Fota	Samples	Location	Wind direction	Distance (m)	Year	TW-REF-NR number	Normec BDS nr	LAB	Analysis
<b>Veg. Moss: 2022</b>											
1	1	V	1 Moss	Loc. C1	South	355	2022	22TWZ-MOS-01-C1 (b)		BDS	DR CALUX
2		V		Loc. C1		355	2022	22TWZ-MOS-01-C1 (b)		Normec	PFAS/ LCMSMS
3	2	V	2 Moss	Loc. C3	South	460	2022	22TWZ-MOS-02-C3 (a)		BDS	DR CALUX
4	3	V	3 Moss	Loc. B			2022	22TWZ-MOS-03-B (b)		BDS	DR CALUX
5	4	V	4 Moss	Loc. D			2022	22TWZ-MOS-04-D		BDS	DR CALUX
6		V		Loc. D			2022	22TWZ-MOS-04-D		Normec	PFAS/ LCMSMS
7	5	V	5 Moss	Loc. Reference Lekunberri			2022	22TWZ-MOS-05-REF		BDS	DR CALUX
<b>Soil: 2022</b>											
8	6	V	1 Soil: rural aera	Loc. C	South	370	2022	22TWZ-SO-HM-01-C	C6434266	Normec	Heavy Metals
<b>Vegetation: 2022</b>											
9	7	V	1 pine needles ( <i>Pinus radiata</i> )	Loc. C	South	370	2022	22TWZ-PR-01-C		BDS	DR CALUX
8			2 pine needles ( <i>Pinus radiata</i> )	Loc. C3	South	460	2022	22TWZ-PR-02-C3			DR CALUX
9			3 pine needles ( <i>Pinus radiata</i> )	Loc. B			2022	22TWZ-PR-03-B			DR CALUX
10			4 pine needles ( <i>Pinus radiata</i> )	Loc. D			2022	22TWZ-PR-04-D			DR CALUX
10	11	V	5 pine needles ( <i>Pinus radiata</i> )	Loc. Reference Lekunberri ?	South	30000	2022	22TWZ-PR-05-REF		BDS	DR CALUX
<b>Sediment / water: 2022</b>											
11	12	V	1 Sediment:	Location 1 - Arkaitzerreka - downstream WtE	North		2022	22TWZ-SEDdn-01		BDS	ERaCALUX
12		V	Sediment:	Location 1 - Arkaitzerreka - downstream WtE	North		2022	22TWZ-SEDdn-01	C6434267	Normec	Heavy Metals
13	13	V	2 Sediment:	Location 2 - Arkaitzerreka - upstream WtE			2022	22TWZ-SEDup-02		BDS	ERaCALUX
14			3 Sediment:	Location 3 - near biomass river	East-NE		2022	22TWZ-SED-03			ERaCALUX
15			4 Sediment:	Location 4 - Abalotz stream	South-East		2022	22TWZ-SED-04			ERaCALUX
14	16	V	5 Water Contamination (< 2 months)				2022	22TWZ-H20-05		BDS	ERaCALUX
15	17	V	6 Water pad/matras (contamination)				2022	22TWZ-PAD-06		Normec	PFAS/ LCMSMS
18			7 Water well Gainaundi				2022	22TWZ-Gan-07			ERaCALUX
<b>Eggs: 2022</b>											
16	19	V	1 Location 1	"press"	North	1610	2022	22TWZ-E01-1p		BDS	DR CALUX
			Location 1	"press"	North	1610	2022	22TWZ-E01-1p			FITC-T4
17		V	Location 1	"press"	North	1610	2022	22TWZ-E01-1p		Normec	PFAS/ LCMSMS
18		V	Location 1	"press"	North	1610	2022	22TWZ-E01-1p		BDS	GC-MS
19	20	V	2 Location 13A	Intusaran	South	3500	2022	22TWZ-E02-13A		BDS	DR CALUX
20		V	Location 13A	Intusaran	South	3500	2022	22TWZ-E02-13A		BDS	GC-MS
			Location 13A	Intusaran	South	3500	2022	21TWZ-E02-13A			FITC-T4
21		V	Location 13A	Intusaran	South	3500	2022	21TWZ-E02-13A		Normec	PFAS/ LCMSMS
21			3 Location 14p	Petritza	North	1370	2022	21TWZ-E03-14p			DR CALUX



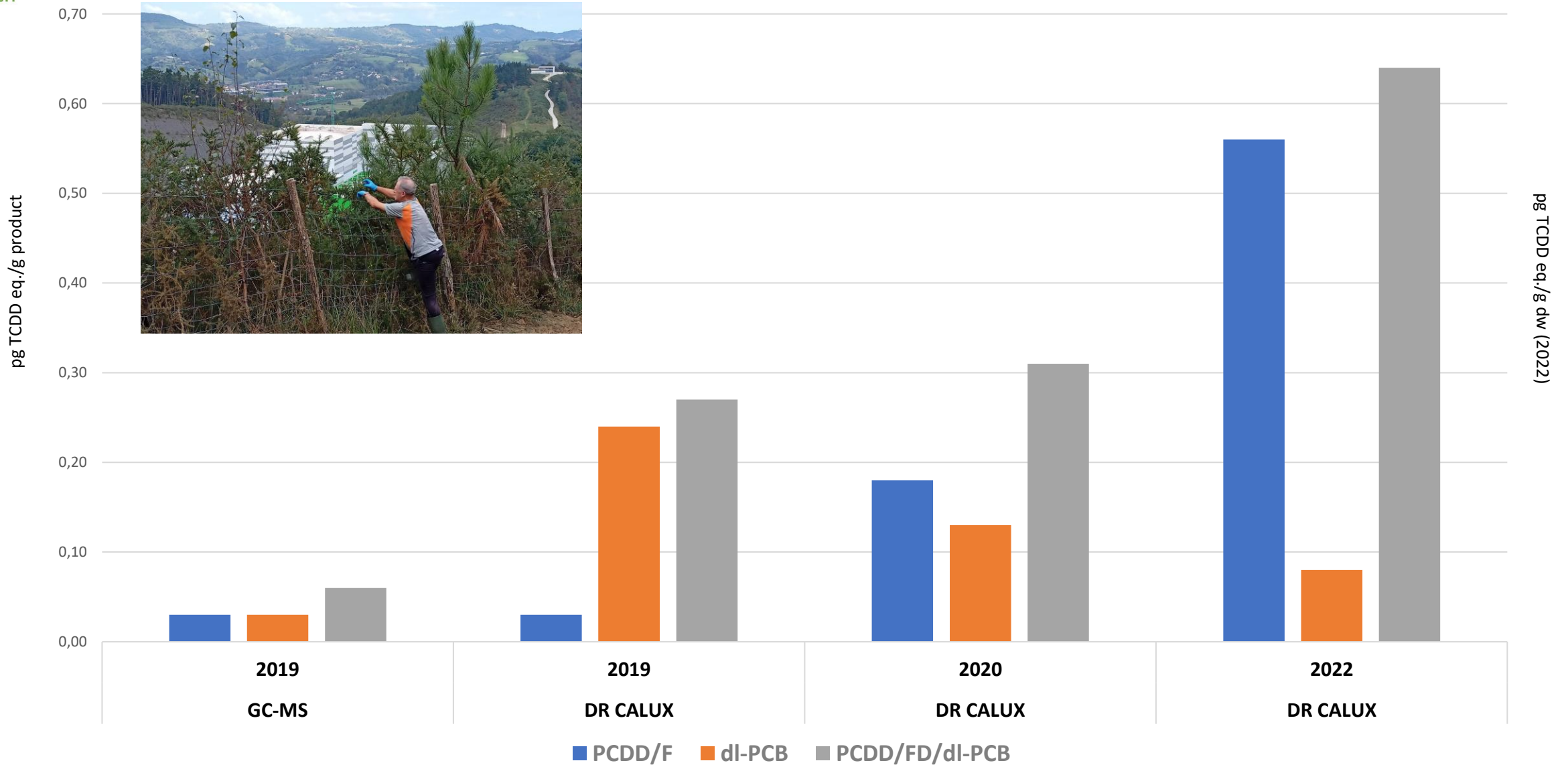


# Overview Results POPs Biomonitoring Zubieta, 2022

Biomonitoring Zubieta 2022											Results 2022										
Sample	Date	Fota	Samples	Location	Wind direction	Distance (m)	Year	TW-REF-NR number	Normec BDS nr	LAB	Analysis	PCDD/F DR CALUX	dl-PCB DR CALUX	PCDD/F/dl-PCB DR CALUX	PCDD/F GC-MS-ub	dl-PCB GC-MS	PCDD/F/dl-PCB GC-MS	EraCALUX	PFAS CALUX	PFAS FITC-T4	Lower bound (LB) PFAS LCMS-MS
				EU: Cut-off value for eggs								1,7		3,3	2,5		5,0		µg PFOA	µg PFOA	
				EU: Action value for eggs											1,75	1,75		pg / 17b	dry weight	dry weight	
												pg BEQ (TCDD)/g fat / veg: dry weight, (dw)			pg TEQ/g fat (veg: dry weight)			Estradiol eq./l	µg PFOA eq./g	µg PFOA eq./g product	(µg/l) ng/g
				Veg. Moss: 2022																	
1	1	V	1 Moss	Loc. C1	South	355	2022	22TWZ-MOS-01-C1 (b)		BDS	DR CALUX	6,2	1,40	7,6							
2	2	V	2 Moss	Loc. C1		355	2022	22TWZ-MOS-01-C1 (b)		Normec	PFAS/ LCMSMS										2,8
3	2	V	2 Moss	Loc. C3	South	460	2022	22TWZ-MOS-02-C3 (a)		BDS	DR CALUX	1,5	0,56	2							
4	3	V	3 Moss	Loc. B			2022	22TWZ-MOS-03-B (b)		BDS	DR CALUX	1,5	1,5	3							
5	4	V	4 Moss	Loc. D			2022	22TWZ-MOS-04-D		BDS	DR CALUX	1,6	2,3	3,9							
6	4	V	4 Moss	Loc. D			2022	22TWZ-MOS-04-D		Normec	PFAS/ LCMSMS										1,7
7	5	V	5 Moss	Loc. Reference Lekunberri			2022	22TWZ-MOS-05-REF		BDS	DR CALUX	0,84	3,4	4,24							
				Soil: 2022																	
8	6	V	1 Soil: rural aera	Loc. C	South	370	2022	22TWZ-SO-HM-01-C	C6434266	Normec	Heavy Metals	AI: 15938	Ag: 0,039/ As: 10,6	Ba: 42,9	Cd: 0,059	Co: 1,1	Cr: 18,2	Cu: 8,6	Hg: 0,056/ Ni: 5,8	Pb: 28,1 / Sn:1,3	Zn: 30,6
				Vegetation: 2022																	
9	7	V	1 pine needles (Pinus radiata)	Loc. C	South	370	2022	22TWZ-PR-01-C		BDS	DR CALUX	0,56	0,08	0,64							
8			2 pine needles (Pinus radiata)	Loc. C3	South	460	2022	22TWZ-PR-02-C3			DR CALUX										
9			3 pine needles (Pinus radiata)	Loc. B			2022	22TWZ-PR-03-B			DR CALUX										
10			4 pine needles (Pinus radiata)	Loc. D			2022	22TWZ-PR-04-D			DR CALUX										
10	11	V	5 pine needles (Pinus radiata)	Loc. Reference Lekunberri ?	South	30000	2022	22TWZ-PR-05-REF		BDS	DR CALUX	0,49	0,49	0,98							
				Sediment / water: 2022																	
11	12	V	1 Sediment:	Location 1 - Arkaitzerreka - downstream WIE	North		2022	22TWZ-SEdn-01		BDS	ERaCALUX							0,063			
12		V	Sediment:	Location 1 - Arkaitzerreka - downstream WIE	North		2022	22TWZ-SEdn-01	C6434267	Normec	Heavy Metals	AI: 9075	Ag: 3,8 / As: 30,1	Ba: 138	Cd: 0,42	Co: 61,3	Cr: 32,2	Cu: 19,7	Hg: 0,12 / Ni: 51,8	Pb: 21,5 / Sn:1,4	Zn: 162
13	13	V	2 Sediment:	Location 2 - Arkaitzerreka - upstream WIE			2022	22TWZ-SEup-02		BDS	ERaCALUX							0,031			
14			3 Sediment:	Location 3 - near biomass river	East-NE		2022	22TWZ-SED-03			ERaCALUX										
15			4 Sediment:	Location 4 - Abalotz stream	South-East		2022	22TWZ-SED-04			ERaCALUX										
14	16	V	5 Water Contamination (< 2 months)				2022	22TWZ-H20-05		BDS	ERaCALUX							0,00021			
15	17	V	6 Water pad/matras (contamination)				2022	22TWZ-PAD-06		Normec	PFAS/ LCMSMS										< 0,1 (LOD)
18			7 Water well Gainaundi				2022	22TWZ-Gan-07			ERaCALUX										
				Eggs: 2022																	
16	19	V	1 Location 1	"press"	North	1610	2022	22TWZ-E01-1p		BDS	DR CALUX	2,2	0,2	2,4							
			Location 1	"press"	North	1610	2022	22TWZ-E01-1p			FITC-T4										
17		V	Location 1	"press"	North	1610	2022	22TWZ-E01-1p		Normec	PFAS/ LCMSMS										0,35
18		V	Location 1	"press"	North	1610	2022	22TWZ-E01-1p		BDS	GC-MS				1,0	1,3	2,3				
19	20	V	2 Location 13A	Intxusaran	South	3500	2022	22TWZ-E02-13A		BDS	DR CALUX	2,0	1,1	3,1							
20		V	Location 13A	Intxusaran	South	3500	2022	22TWZ-E02-13A		BDS	GC-MS				1,1	1,5	2,6				
			Location 13A	Intxusaran	South	3500	2022	21TWZ-E02-13A			FITC-T4										
21		V	Location 13A	Intxusaran	South	3500	2022	21TWZ-E02-13A		Normec	PFAS/ LCMSMS										0,11
21	21		3 Location 14p	Petritza	North	1370	2022	21TWZ-E03-14p			DR CALUX										

## Key findings biomonitoring Zubieta 2022

- **Dioxins (PCDD/F/dl-PCB) increased in Mosses**
- **PFAS found in the biomatrices Mosses, Eggs and Sediment**
- **Dioxins (PCDD/F/dl-PCB) found increased in pine needles *Pinus radiata* at location C near waste incinerator**
- **Heavy Metals are increased in soil and sediment,**
- **Dioxin (PCDD/F) results in Eggs on the two (2) locations are above EU limit for bioassay analyses DR CALUX**
- **Water: Increase of oestrogenic activity with an exceeding of factor 6 or 636%**



Chemical analyses GC-MS

Bioassay analyses dioxins (PCDD/F/dl-PCB) with DR CALUX

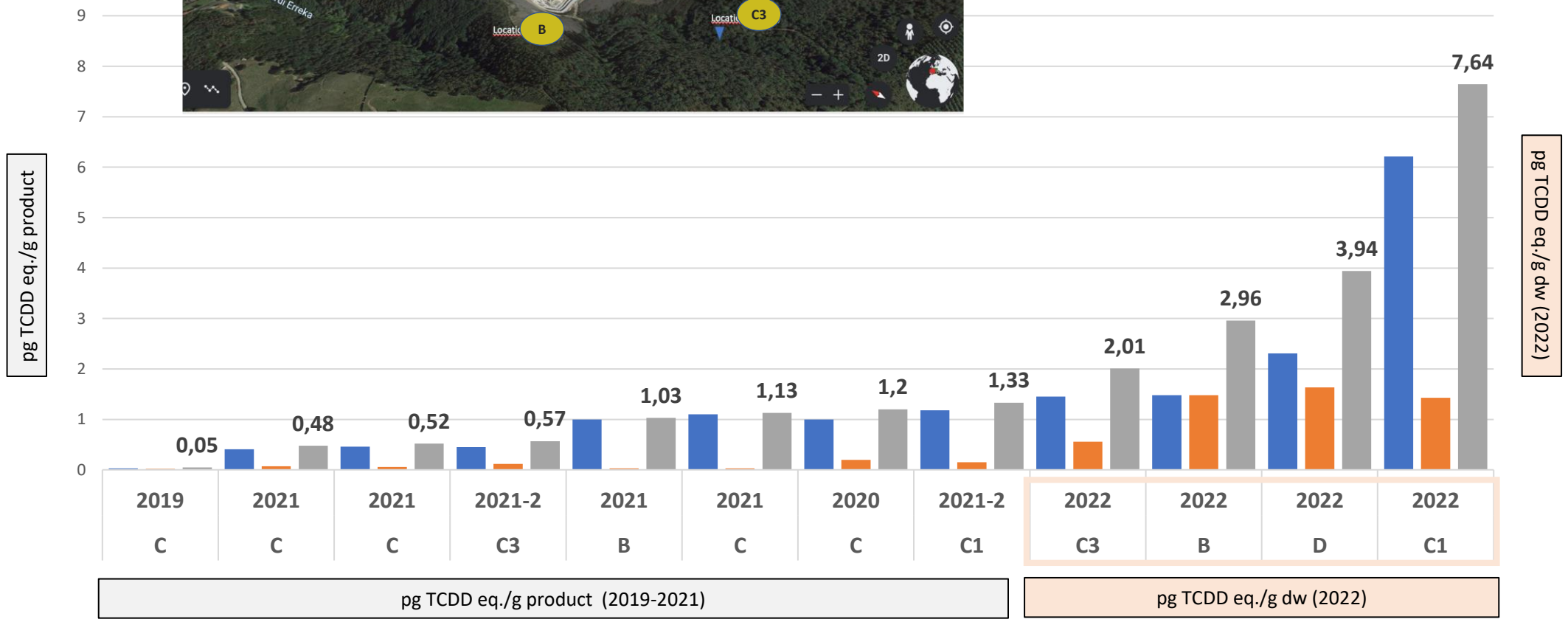
Biomonitoring Zubieta 2022											Results 2022											
Sample Date	Fota	Samples	Location	Wind direction	Distance (m)	Year	TW-REF-NR number	Normec BDS nr	LAB	Analysis	Medium bound (MB)			Lower bound (LB)								
											PCDD/F DR CALUX	di-PCB DR CALUX	PCDD/F/di-PCB DR CALUX	PCDD/F GC-MS-ub	di-PCB GC-MS	PCDD/F/di-PCB GC-MS	ERaCALUX	PFAS CALUX	PFAS FITC-T4	PFAS LCMS-MS		
											1.7		3.3	2.5		5.0						
														1.75	1.75		pg / 17b	µg PFOA dry weight	µg PFOA dry weight			
											pg BEQ (TCDD)/g fat / veg: dry weight, (dw)			pg TEQ/g fat (veg: dry weight)			Estradiol eq./l	µg PFOA eq./g	µg PFOA eq./g product	(µg/ l) ng / g		
Veg. Moss: 2022																						
1	1	V	1 Moss	Loc. C1	South	355	2022	22TWZ-MOS-01-C1 (b)	BDS	DR CALUX	6,2	1,40	7,6									
2	2	V	2 Moss	Loc. C1		355	2022	22TWZ-MOS-01-C1 (b)	Normec	PFAS/ LCMSMS										2,8		
3	2	V	3 Moss	Loc. C3	South	460	2022	22TWZ-MOS-02-C3 (a)	BDS	DR CALUX	1,5	0,56	2									
4	3	V	4 Moss	Loc. B			2022	22TWZ-MOS-03-B (b)	BDS	DR CALUX	1,5	1,5	3									
5	4	V	5 Moss	Loc. D			2022	22TWZ-MOS-04-D	BDS	DR CALUX	1,6	2,3	3,9									
6	5	V	6 Moss	Loc. D			2022	22TWZ-MOS-04-D	Normec	PFAS/ LCMSMS										1,7		
7	5	V	7 Moss	Loc. Reference Lekunberri			2022	22TWZ-MOS-05-REF	BDS	DR CALUX	0,84	3,4	4,24									



# Dioxins (PCDD/F/dl-PCB) mosses 2019-2022, Zubieta

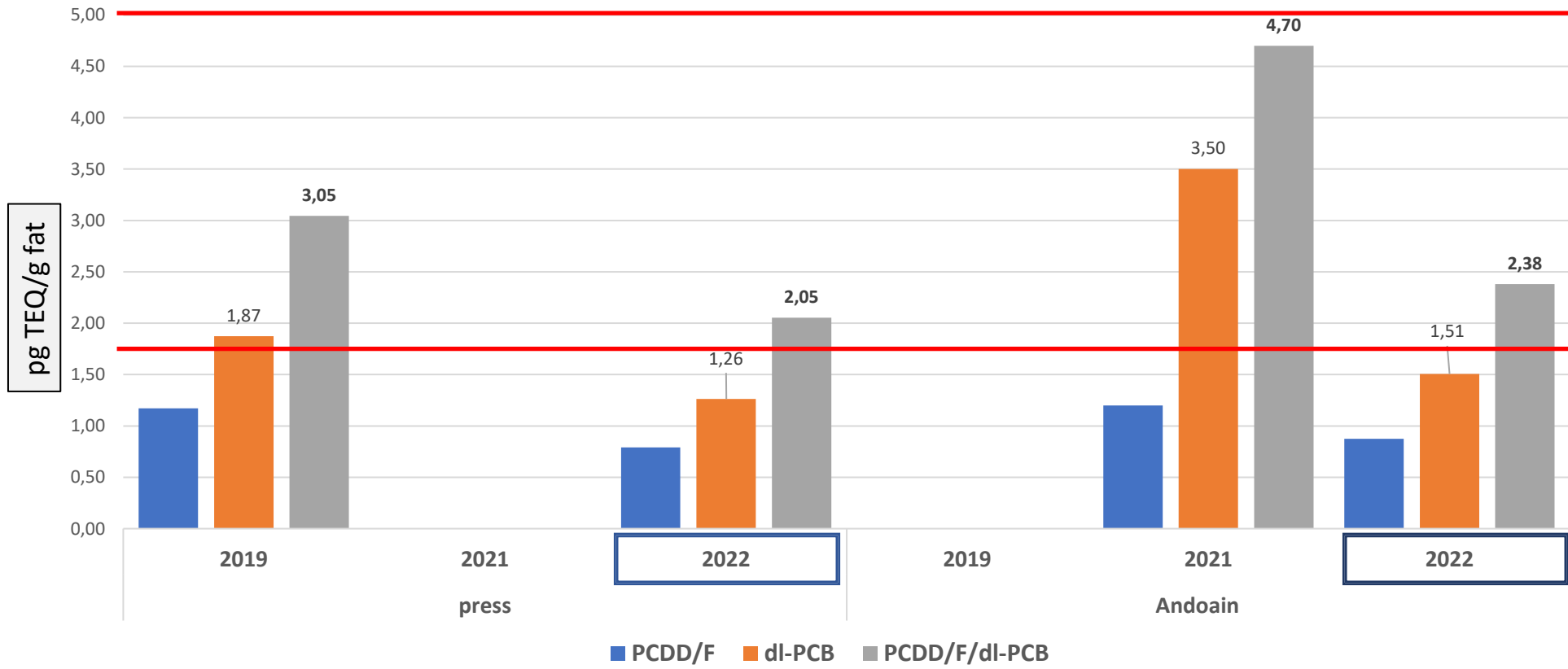


- PCDD/F
- dl-PCB
- PCDD/F/dl-PCB



↑  
Below detection limit

Dioxins (PCDD/F/dl-PCB) in Eggs, chemical analyses GC-MS Zubieta, 2022



**EU Limit: 5,0 pg TEQ /g fat**  
PCDD/F/dl-PCB

**EU Action limit: 1,75 pg TEQ/g fat**  
PCDD/F/dl-PCB

Location: 22TWZ-E01-1p

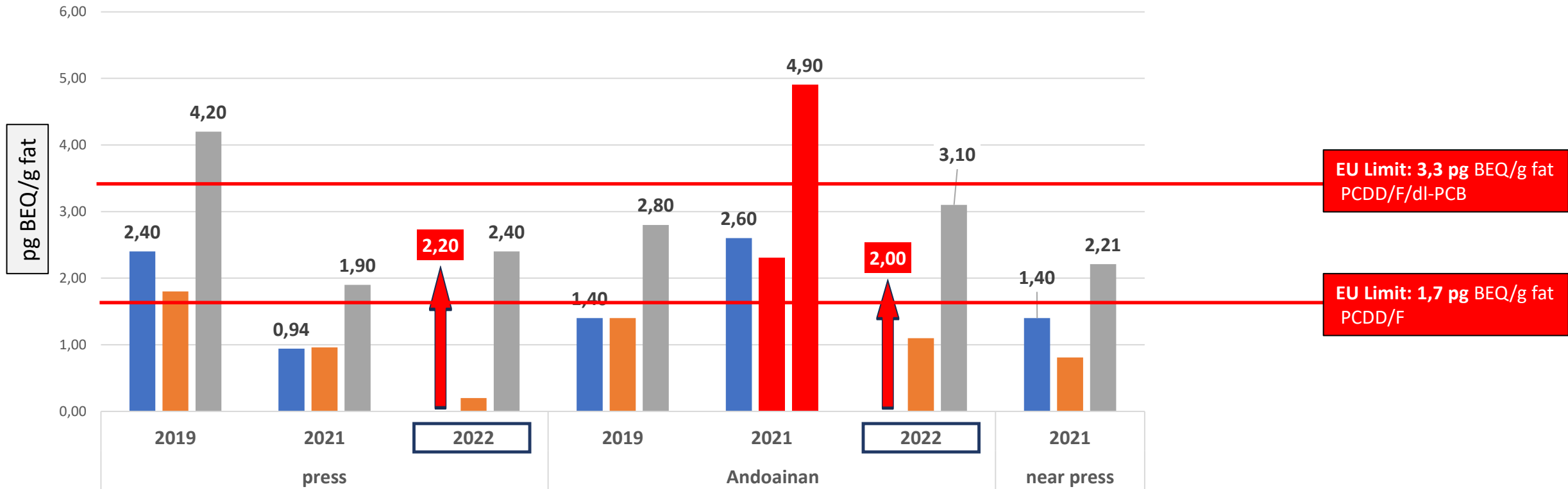
Location: 22TWZ-E02-13A



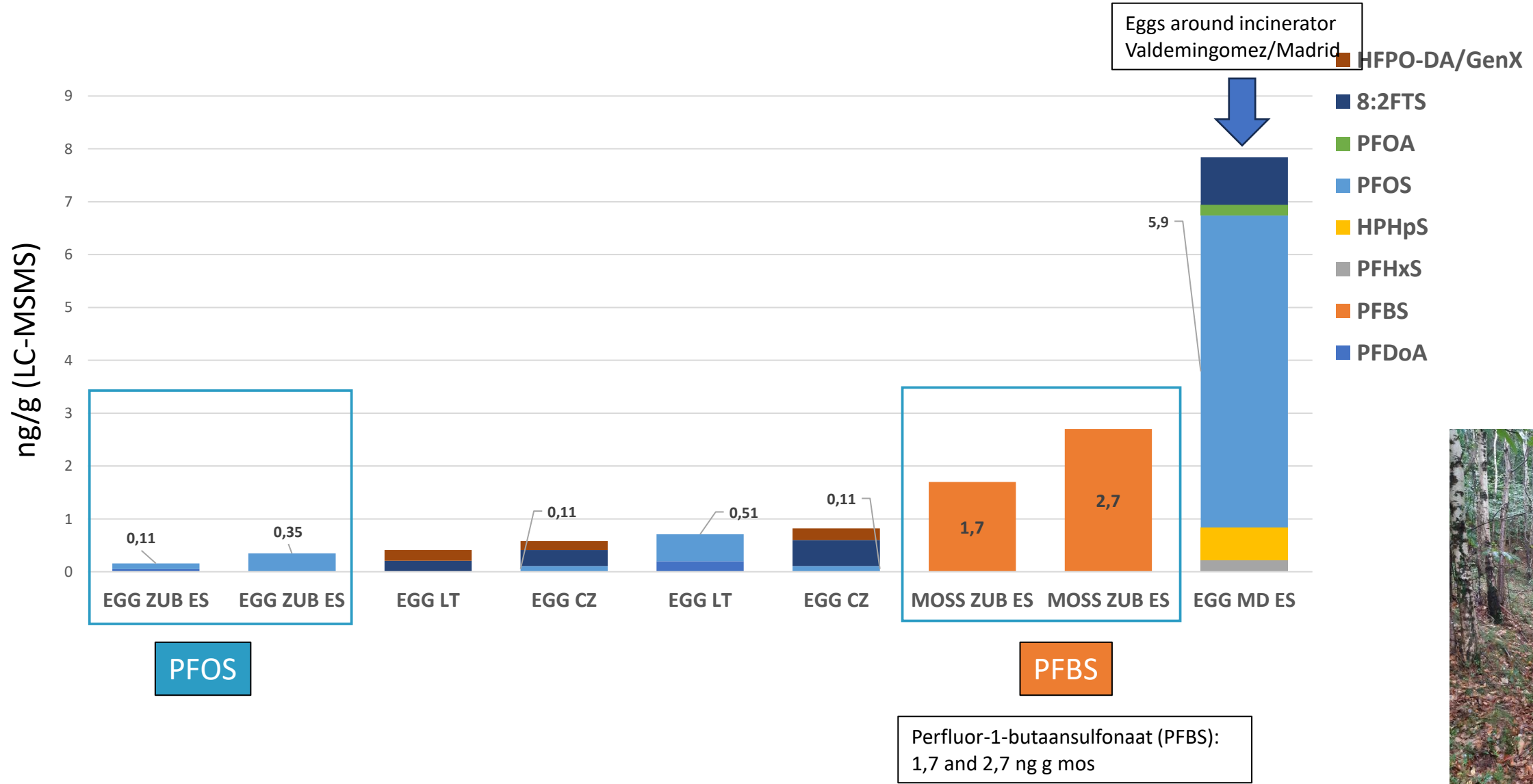


Dioxins (PCDD/F/dl-PCB) in Eggs, bioassay analyses DR CALUX

- PCDD/F
- dl-PCB
- PCDD/F/dl-PCB



In 2022: the two (2) samples of eggs exceed the action limit DR CALUX for PCDD/F



CONCENTRATIONS	TEF
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.01
Octachlorodibenzo-p-dioxin	0.0003
2,3,7,8-Tetrachlorodibenzofuran	0.1
1,2,3,7,8-Pentachlorodibenzofuran	0.03
2,3,4,7,8-Pentachlorodibenzofuran	0.3
1,2,3,4,7,8-Hexachlorodibenzofuran	0.1
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1
1,2,3,7,8,9-Hexachlorodibenzofuran	0.1
2,3,4,6,7,8-Hexachlorodibenzofuran	0.1
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01
Octachlorodibenzofuran	0.0003
3,3',4,4'-Tetrachlorobiphenyl (#77)	0.0001
3,4,4',5-Tetrachlorobiphenyl (#81)	0.0003
3,3',4,4',5-Pentachlorobiphenyl (#126)	0.1
3,3',4,4',5,5'-Hexachlorobiphenyl (#169)	0.03
2,3,3',4,4'-Pentachlorobiphenyl (#105)	0.00003
2,3,4,4',5-Pentachlorobiphenyl (#114)	0.00003
2,3',4,4',5-Pentachlorobiphenyl (#118)	0.00003
2,3,4,4',5-Pentachlorobiphenyl (#123)	0.00003
2,3,3',4,4',5-Hexachlorobiphenyl (#156)	0.00003
2,3,3',4,4',5'-Hexachlorobiphenyl (#157)	0.00003
2,3',4,4',5,5'-Hexachlorobiphenyl (#167)	0.00003
2,3,3',4,4',5,5'-Heptachlorobiphenyl (#189)	0.00003

Location: 1p - Press

Location: 13A - Andoain

Location: 14p - Petritza

19-E01-1p	21-E01-1p	22-E01-1p	19-TWZ-013	21-E03-13A	22-E02-13A	21TWZ-E02-14p
0.065		0.10		0.10	0.10	
0.302		0.10		0.32	0.10	
0.455		0.10		0.22	0.29	
0.994		1.00		1.10	0.63	
0.358		0.50		0.30	0.79	
7.570		2.80		2.80	1.40	
15.400		5.90		3.70	1.90	
1.390		0.88		2.00	0.98	
0.518		0.35		0.69	0.54	
0.701		0.75		1.00	0.79	
0.487		0.10		0.50	0.29	
0.345		0.10		0.78	0.46	
0.062		0.10		0.10	0.10	
0.747		0.10		0.27	0.35	
0.645		3.70		2.70	1.60	
0.060		0.10		0.10	0.10	
0.384		0.10		0.28	0.10	

19-E01-1p	21-E01-1p	22-E01-1p	19-TWZ-013	21-E03-13A	22-E02-13A	21TWZ-E02-14p
50.50		25.00		32.00	23.00	
6.98		3.70		2.60	3.00	
16.70		12.00		33.00	14.00	
1.85		0.10		5.10	2.00	
1110.00		450.00		620.00	210.00	
47.20		18.00		24.00	10.00	
2350.00		850.00		1800.00	650.00	
50.50		32.00		32.00	22.00	
687.00		240.00		760.00	240.00	
138.00		54.00		130.00	42.00	
275.00		150.00		430.00	200.00	
80.80		60.00		170.00	62.00	

< Limit of Quantification (LOQ)

Location: 1p - Press

Location: 13A - Andoain

**CONCENTRATION (GC-MS)**

	19-E01-1p	22-E01-1p	21-E03-13A	22-E02-13A
PCDD	25.14	10.5	8.5	5.2
PCDF	5.34	6.3	8.4	5.3
PCB	4814.53	1894.8	4038.7	1478.0
PCDD/F	30.48	16.8	17.0	10.5
PCDD/F/dl-PCB	4845.01	1911.6	4055.7	1488.5

pg/g fat

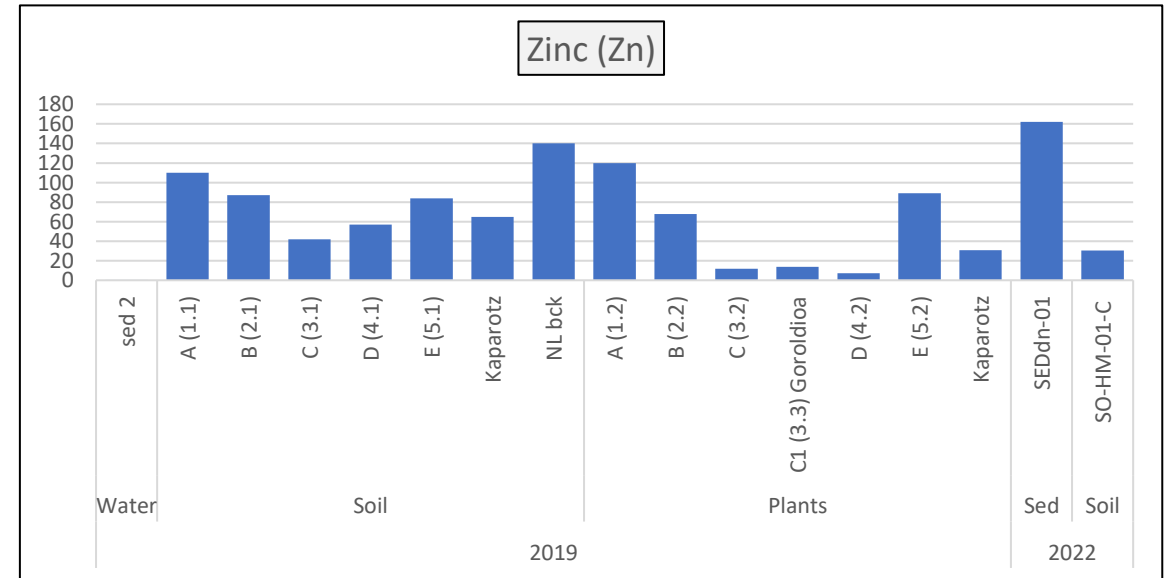
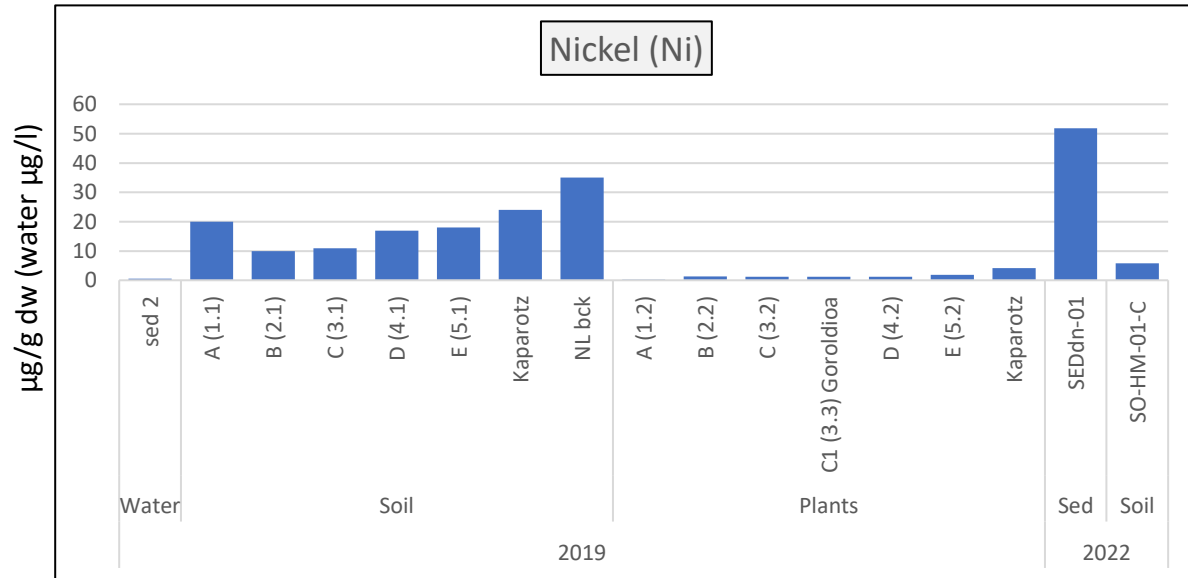
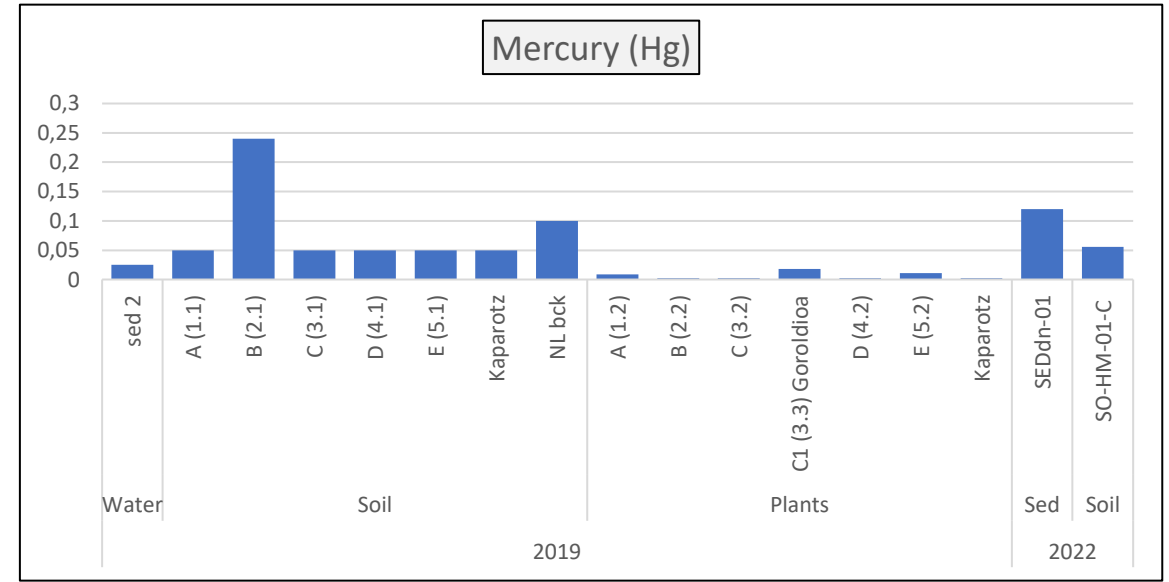
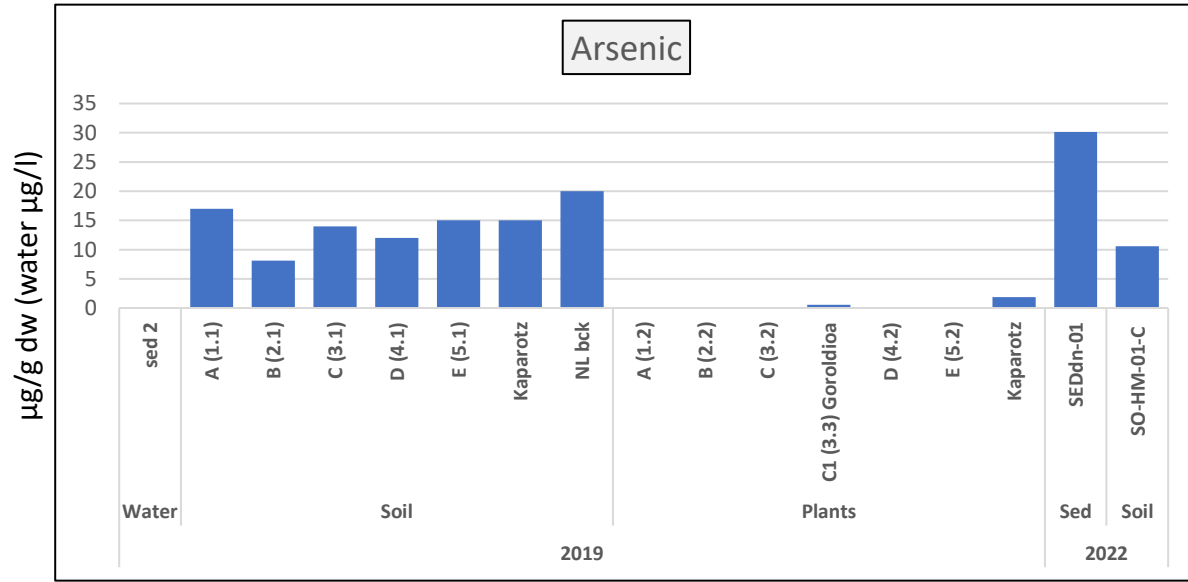
**TEQ (GC-MS)**

	19-E01-1p	22-E01-1p	21-E03-13A	22-E02-13A
PCDD TEQ	0.63	0.39	0.61	0.39
PCDF TEQ	0.54	0.40	0.71	0.49
PCDD/F TEQ	1.17	0.79	1.32	0.87
dl-PCB	1.87	1.26	3.58	1.51
PCDD/F/dl-PCB	3.05	2.05	4.90	2.38

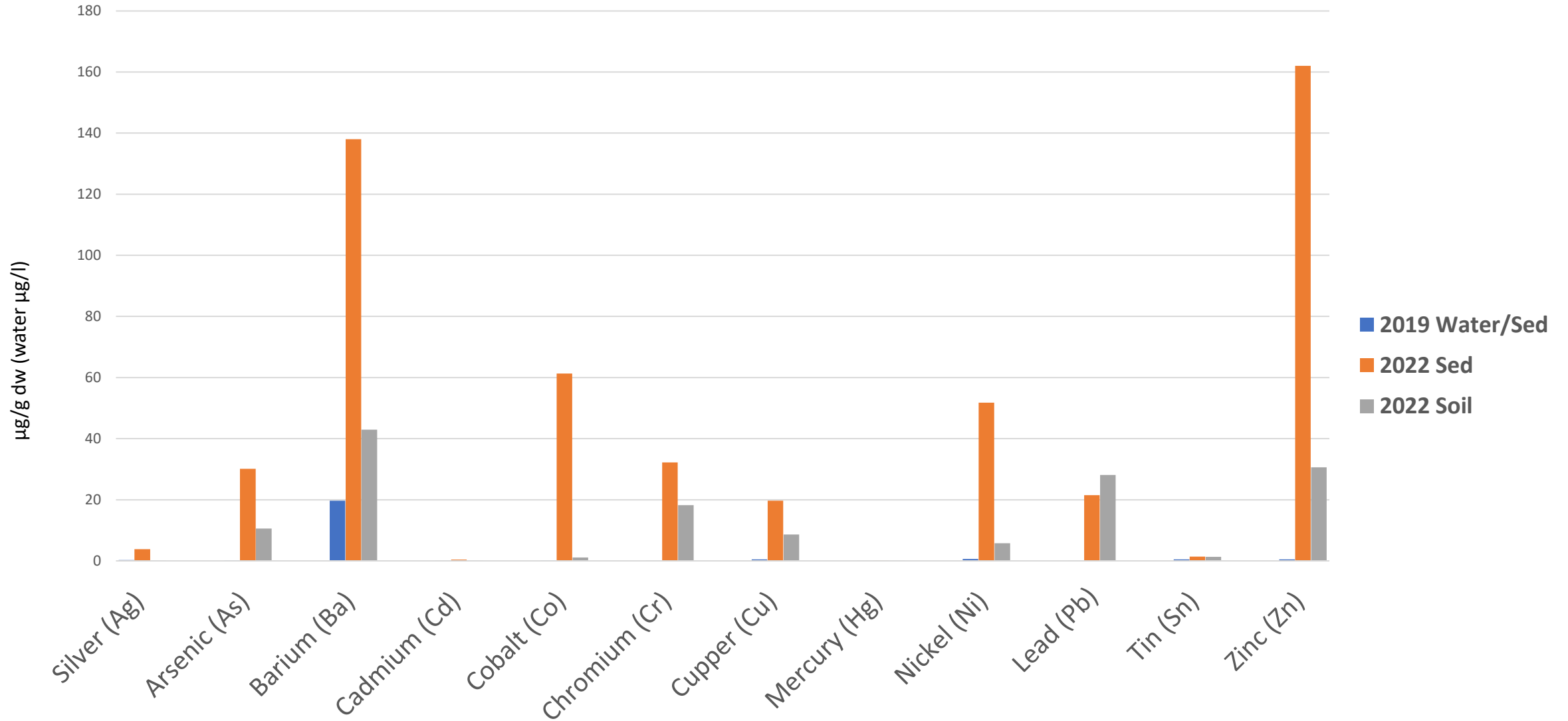
pg TEQ/g fat

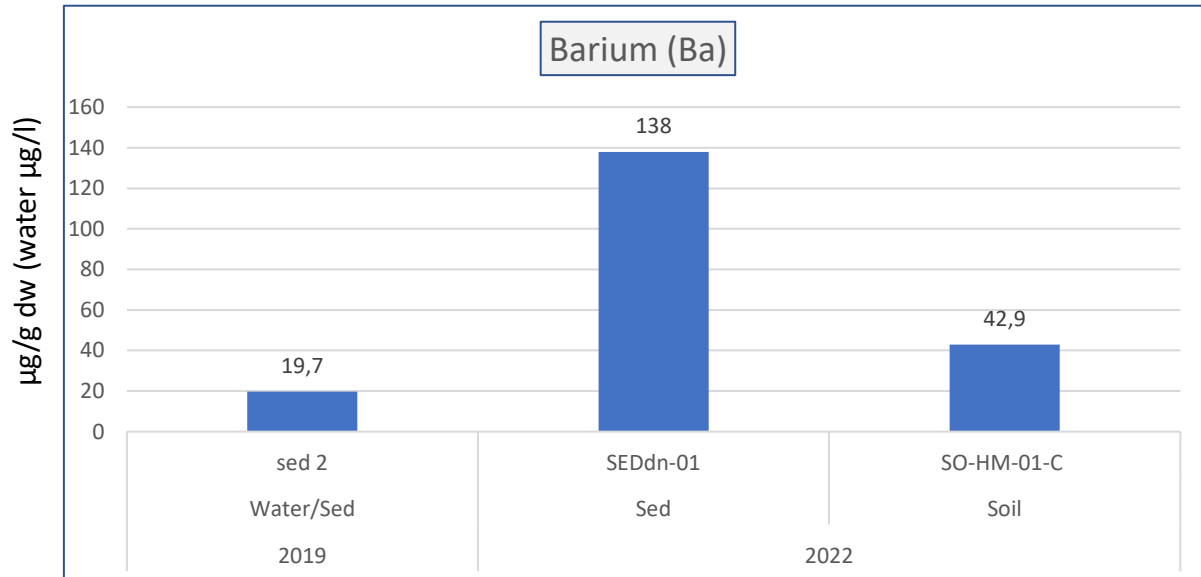
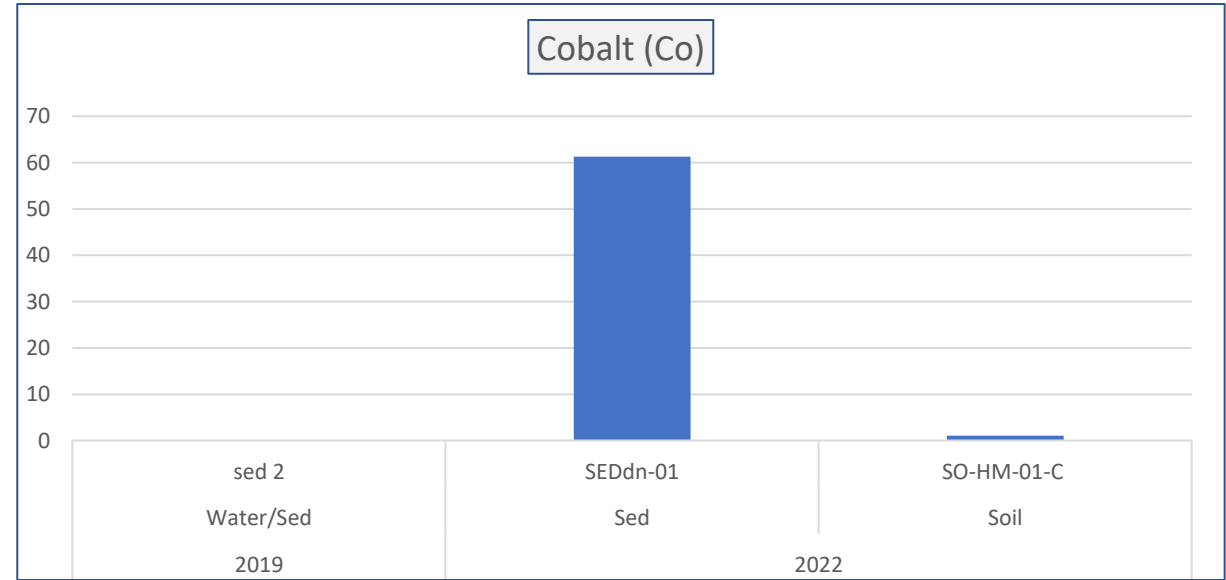
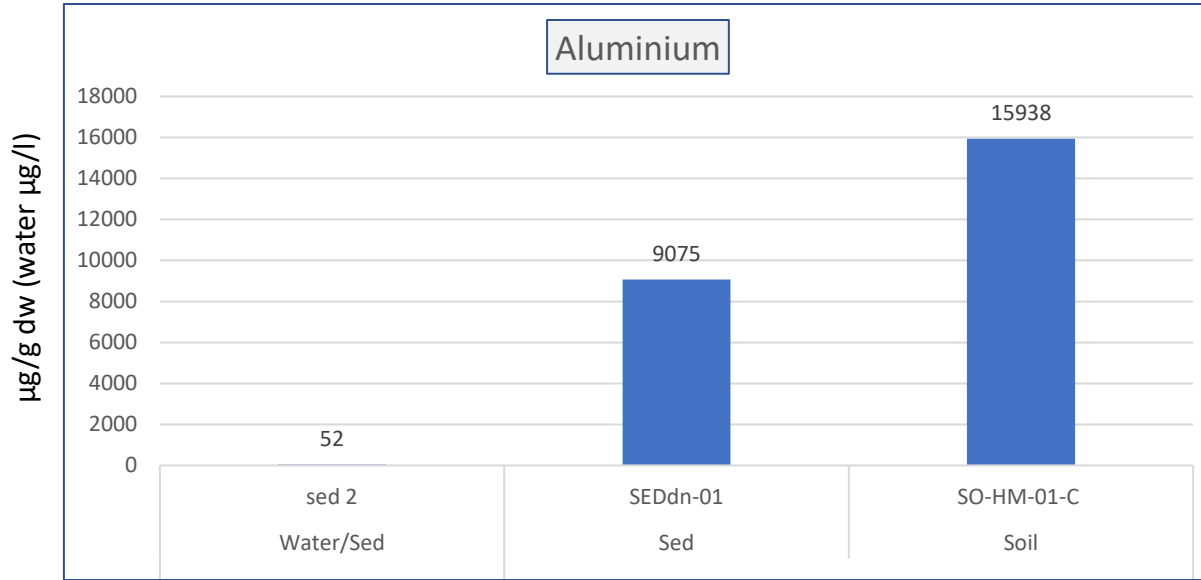
HEAVY METALS (MB)																		
		2019 (TW)	2019 (Geyser: Lab Eurofins)														2022 (TW: Normec)	
		Water	Soil							Vegetation (leaves, pine needles)							Sed	Soil
Medium Bound (MB)		Sed 2	A (1.1)	B (2.1)	C (3.1)	D (4.1)	E (5.1)	Kaparotz	NL back	A (1.2)	B (2.2)	C (3.2)	C1 (3.3) Goroldioa	D (4.2)	E (5.2)	Kaparotz	SEDdn-01	SO-HM-01-C
Heavy Metal		µg/l	µg/g														Dry Weight (dw) µg/g dw	
1	Aluminium (Al)	52															9075	15938
2	Silver (Ag)	0,25															3,8	0,039
3	Arsenic (As)	0,11	17	8,1	14	12	15	15	20	0,05	0,05	0,05	0,6	0,05	0,05	1,9	30,1	10,6
4	Barium (Ba)	19,7															138	42,9
5	Cadmium (Cd)	0,05	0,2	0,2	0,2	0,2	0,2	0,2	0,6	0,4	0,31	0,09	0,04	0,02	0,74	0,16	0,42	0,059
6	Cobalt (Co)	0,1															61,3	1,1
7	Chromium (Cr)	0,05	28	15	18	18	23	22	55	0,16	0,42	0,33	5,2	0,82	0,29	11	32,2	18,2
8	Copper (Cu)	0,5	28	16	11	16	17	13	40	1,8	2,2	1,9	1,7	1,7	3,9	5,4	19,7	8,6
9	Mercury (Hg)	0,025	0,05	0,24	0,05	0,05	0,05	0,05	0,1	0,009	0,0025	0,0025	0,018	0,0025	0,011	0,0025	0,12	0,056
10	Nickel (Ni)	0,61	20	10	11	17	18	24	35	0,3	1,4	1,2	1,3	1,2	1,9	4,2	51,8	5,8
11	Lead (Pb)	0,05	51	77	33	28	80	23	50	0,08	0,05	0,025	2,2	0,025	0,21	4,2	21,5	28,1
12	Tin (Sn)	0,5															1,4	1,3
13	Zinc (Zn)	0,5	110	87	42	57	84	65	140	120	68	12	14	7,5	89	31	162	30,6
14	Manganese (Mn)		590	230	100	210	180	300		210	1400	22	83	25	270	160		

< Limit of Quantification (LOQ)



# Heavy Metals Results water, soil, sediments 2019- 2022, Zubieta, 2022









Id.Cliente:				52467
Id.Agrupa:	Id.Analito:	Unidades	Incertidumbre	MS4365-22-15639
Arsénico disuelto	48750	µg/l	31,7	6,76
Cadmio disuelto	48748	µg/l	19,3	< 2,5 (< 0,5)
Calcio	48717	mg/l	28,9	177
Cobre disuelto	48746	µg/l	28,1	5,59
Cromo disuelto	48736	µg/l	29	129
Hierro disuelto	48731	mg/l	33,6	5,58
Magnesio	48718	mg/l	26,1	30,1
Mercurio disuelto	48749	µg/l	32,2	< 1,0 (< 0,2)
Níquel disuelto	48733	µg/l	23,4	81
Plomo disuelto	48745	µg/l	29,6	3,95
Zinc disuelto	48747	µg/l	28,1	36
Cloruros	48682	mg/l	25,4	487
Fluoruros	48704	mg/l	25,7	0,247
Nitratos	48686	mg/l	26	1,2
Ortofosfatos	48826	mg PO4/l	26,2	< 0,75
Sulfatos	48681	mg/l	26,2	42,9
Amonio	48763	mg/l	25,7	117
Conductividad a 25 °C	48222	µS/cm	17,7	3610
pH	48221	unid. de pH	0,3	7,41
Tensioactivos aniónicos (SAAM)	48397	mg/l	28	0,271
Carbono Orgánico Total	5000521	mg/l	28	215
DBO5 Total	48290	mg/l	28	No Realizado
Demanda Química de Oxígeno (DQO)	5000124	mg/l	30,2	451
Sólidos en Suspensión	48169	mg/l	20,3	86
Turbidez	48398	unf	25	59,6

Upper limit Calcium : 180 mg/l

Chromo: 129 ug/l, norm: 50 ug/l

Nickel: 81 ug/l, norm: 20 ug/l

Chlorine: 487 mg,  
drinkwater norm 0,25 mg/l,  
basic water: 150 mg/lAmmonium: 117 mg/l,  
Norm 0.608 mg/lConductivity: 3610 uS/cm  
Norm:1.216 µS/cm

TOC: 215 mg/l, norm 3 mg/l

Chemical oxygen : 451 mg/l,  
norm: 40 mg/l

Analyses by TW on oestrogenic activity (22TWZ-H2O-05), BDS 44145 : 0.21 ng 17b Estradiol eq./l  
In 2019 water on location 2, sediment Arkaitzerreka (TW-RW0-0, 36052): 0.033 ng 17b Estradiol eq./l

**Meaning of oestrogenic activity an exceeding of factor 6 or 636%**

Water at location Gainaudi has a comparable level of 0.036 ng 17b Estradiol eq./l

Sediment 1  
Results  
ERaCALUX

S1



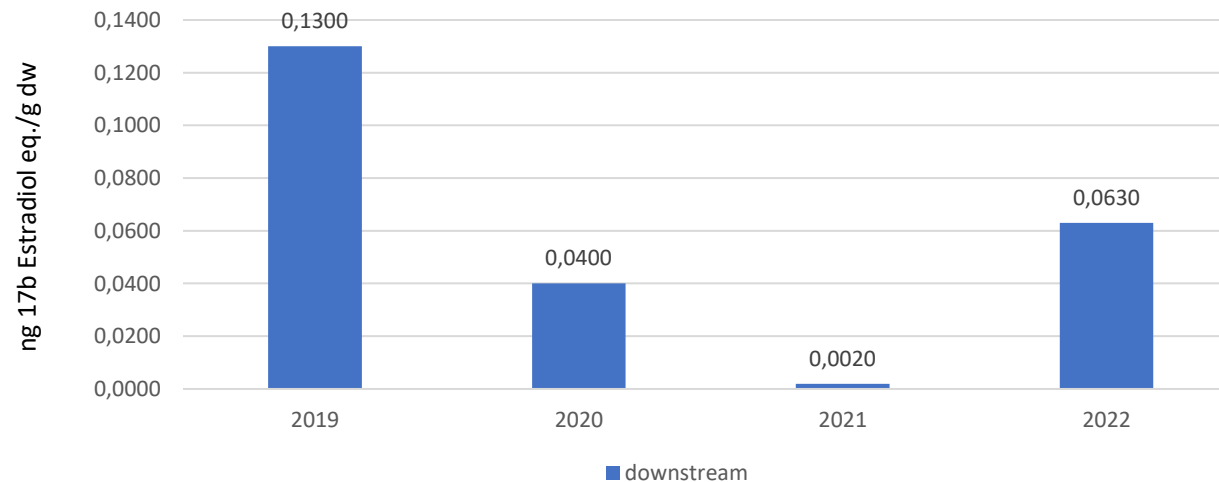
Results 2019  
**ERaCALUX: 0,130 ng 17b Estradiol eq./g dw**

Results 2020  
**ERaCALUX: 0,040 ng 17b Estradiol eq./g dw**  
**PFAS: 0,063 µg PFOA eq./g dw**

Results 2021  
**ERaCALUX: LOQ < 0.0039 ng 17b Estradiol eq./g dw**

Results 2022  
**ERaCALUX: 0,063 ng 17b Estradiol eq./g dw**

Estrogenic activity Arkaitzerreka downstream



Sediment 2  
Results  
ERaCALUX

S2



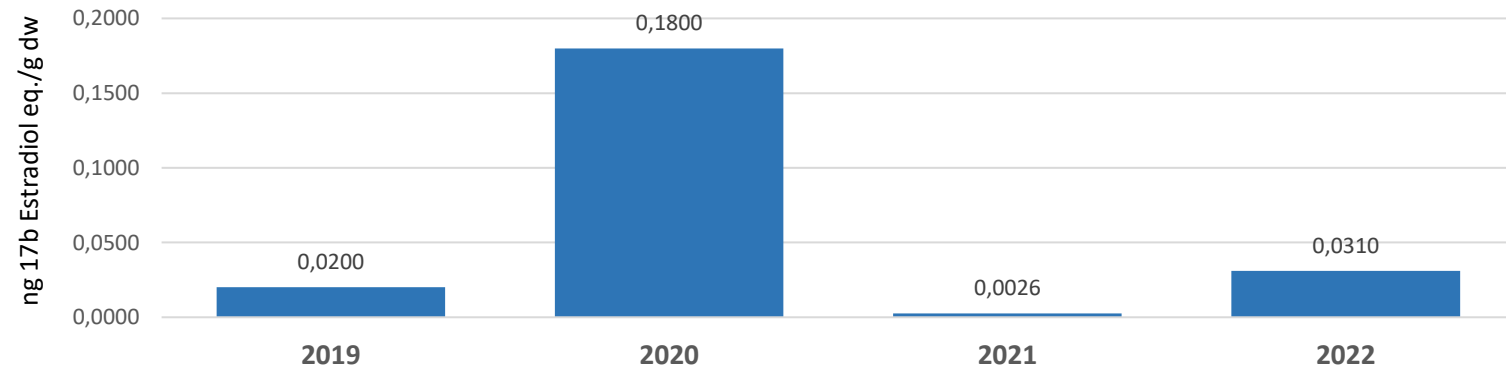
Results 2019  
**ERaCALUX: 0,020 ng 17b Estradiol eq./g dw**

Results 2020  
**ERaCALUX: 0,018 ng 17b Estradiol eq./g dw**  
**PFAS: 0,014 ug PFOA eq./g dw**

Results 2021  
**ERaCALUX: LOQ < 0.0051 ng 17b Estradiol eq./g dw**

Results 2022:  
**ERaCALUX: 0.031 ng 17b Estradiol eq./g dw**

Estrogen activity in water upstream Arkaitzerreka





## Annex 1

Total overview 4 years biomonitoring samples & results, Zubieta 2019-2022  
Financial overview TW 2022







Biomonitoring Zubieta 2019-2021												Results 2019-2021										
Sample Date	Total	Samples	Location	Wind direction	Distance m	Year	TW-REF-NR number	BDS nr	Matrix BDS	Analysis	PCDD/F DR CALUX	di-PCB DR CALUX	PCDD/F/di-PCB DR CALUX	PCDD/F GC-MS-ub	di-PCB GC-MS	PCDD/F/di-PCB GC-MS	ERaCALUX	PFAS CALUX	PFAS FITC-T4			
											Upperbound (UB)			Upperbound (UB)								
											1.7		3.3	2.5		5.0						
											pg BEQ (TCDD)/g fat (veg: product)			pg TEQ/g fat (veg: product)			pg / 17b	dry weight	dry weight			
T	Y	S	Eggs:	Eggs 2019																		
42	16	1	V	10-9-2019	1	Location 1 Zubieta	"Press"	North	1610	2019	TWZ-001 (GC-MS 1901)	35905	food/egg	DR CALUX	1.8	0.6	2.4					
43	17		V	10-9-2019	1	Location 1 Zubieta	"Press"	North	1610	2019	TWZ-001 (GC-MS 1901)		GC-MS			1.17	1.94	3.11				
44	18	2	V	9-9-2019	2	Location 2 AÑORGA	"Paradise, Wol"	North-East	5470	2019	TWZ-002	35906	food/egg	DR CALUX	0.96	1.64	2.6					
45	19	3	V	9-9-2019	3	Location 3 Hernani	Fig/pallet wood burning/ Sawmill	North-East	4250	2019	TWZ-003	35928	food/egg	DR CALUX	6.1	1.5	7.6					
46	20	4	V	9-9-2019	4	Location 4 Gainaundi	Horseman/Water-well	North-East	955	2019	TWZ-004	35907	food/egg	DR CALUX	0.99	0.71	1.7					
			X	10-9-2019		Location 5 Agina	"Pumpkin", black hens	North-West	3440	2019												
47	21	5	V	10-9-2019	5	Location 6 Kaparotz	"Aluminium smelt UCIN"	North-West	2570	2019	TWZ-006	35909	food/egg	DR CALUX	3.8	0.9	4.7					
48	22	6	V	10-9-2019	6	Location 7 Zaltzate	Flowers	North-East	3280	2019	TWZ-007	35910	food/egg	DR CALUX	0.86	2.44	3.3					
			X	10-9-2019		Location 8 Lasarte, Hernani	"Asbest / horse"	North-East	3380	2019												
49	23	7	V	12-9-2019	7	Location 9 Urnieta	Baby/Hunting dogs	North-East	4490	2019	TWZ-009	35929	food/egg	DR CALUX	1.8	1.5	3.3					
50	24	8	V	12-9-2019	8	Location 10 Segoretegi, Andoain	"Highway A15"	South	3870	2019	TWZ-010	35930	food/egg	DR CALUX	4.4	0.4	4.8					
51	25	9	V	13-9-2019	9	Location 11 Udarnita/Zaldibia	(M&P)	South	26400	2019	TWZ-011	35911	food/egg	DR CALUX	0.89	0.81	1.7					
			X			Location 12 Bugati	= location 4b (alternative)	South	3680	2019												
52	26	10	V	1-12-2019	10	Location 13 Andoain		South	3600	2019	TWZ-013	36673	food/egg	DR CALUX	1.4	0.0	1.4					
						Eggs 2020																
53	17	1	V	30-11-2020	1	location 1 'press'	"Press"	North	1610	2020	20TWZ-001/1p	39359	Food egg	DR CALUX	0.84	0.76	1.6					
			X	30-11-2020		location 4b (alternative)	4b (alternative)	North-East	955	2020	20TWZ-002/4b		DR CALUX									
54	18	2	V	30-11-2020	2	Supermarket Eggs	Local supermarket			2020	20TWZ-000/sup	39360	Food egg	DR CALUX	LOQ < 0.3	LOQ < 0.3	LOQ < 0.6					
						Eggs 2021																
55	11	1	V	1-10-2021	1	Location 1 Zubieta	"Press"	North	1610	2021	21TWZ-E01-1p	41611	Food egg	DR CALUX	0.94	0.96	1.9					
56	12		V	1-10-2021		Location 1 Zubieta	"Press"	North	1610	2021	21TWZ-E01-1p	41611	Food egg	FITC-T4						1.9		
57	13	2	V	1-10-2021	2	Location 13A - IAndoain		South	3500	2021	21TWZ-E03-13A	41612	Food egg	DR CALUX	2.6	2.3	4.9					
58	14		V	4-11-2021		Location 13A - Andoain		South	3500	2021	21TWZ-E03-13A	41730	Food egg	GC-MS		1.5	3.5	5.0				
59	15		V	4-11-2021		Location 13A - Andoain		South	3500	2021	21TWZ-E03-13A	41730	Food egg	FITC-T4						1.9		
60	16	3	V	1-10-2021	3	Location 14p - Petritza		North	1370	2021	21TWZ-E02-14p	41613	Food egg	DR CALUX	0.81	0.59	1.4					



Samples in 2019, in Total: **27 analysis** MM-3, Mosses-2, Veg-4, Sediment-4, Water-3, Eggs-10 locations / 11 analysis



Samples in 2020, in Total: **18 analysis** MM-0, Mosses-8, Veg-2, Sediment-6, Water-0, Eggs-2 locations / 2 analysis



Samples in 2021, in Total: **16 analysis** MM-0, Mosses-8, Veg-0, Sediment-2, Water-0, Eggs-3 locations / 6 analysis



Samples in 2022, in Total: **21 analysis** MM-0, Mosses-7, Veg-2, Sediment/Soil-4, Water-2, Eggs-2 locations / 6 analysis

**2019- 2022 = Total: 82 analysis**